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(page 41)

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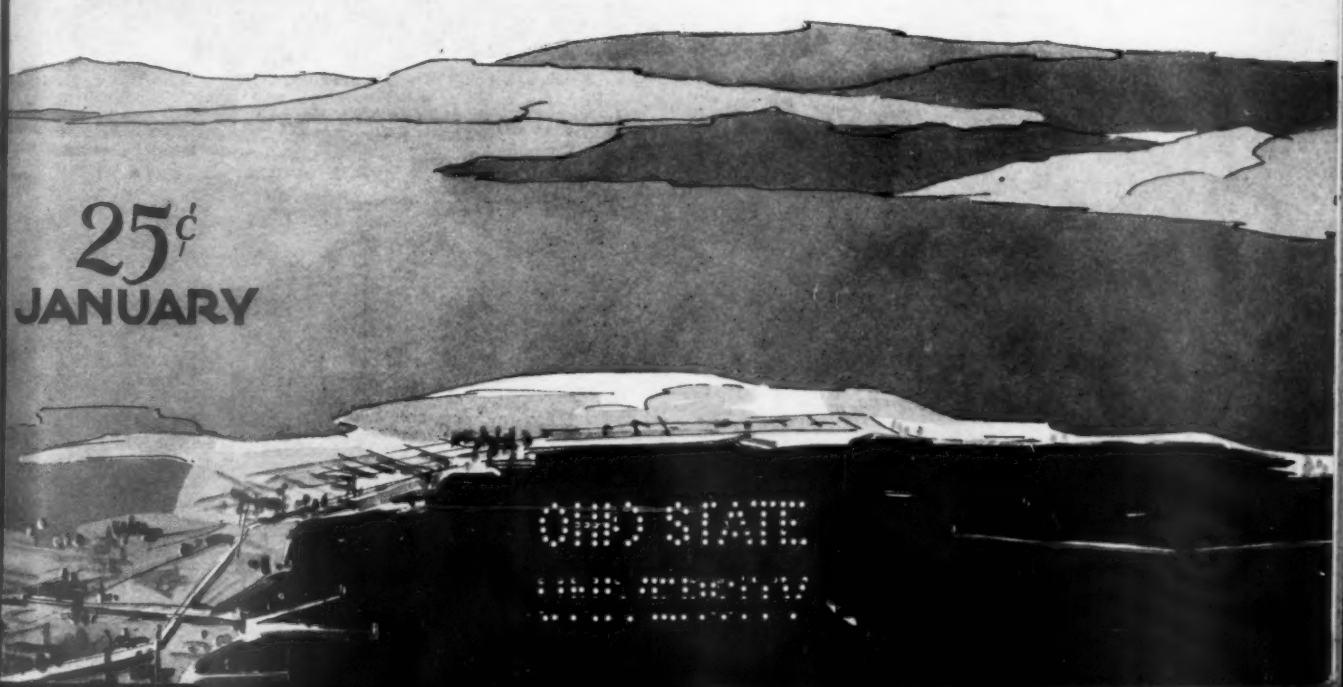

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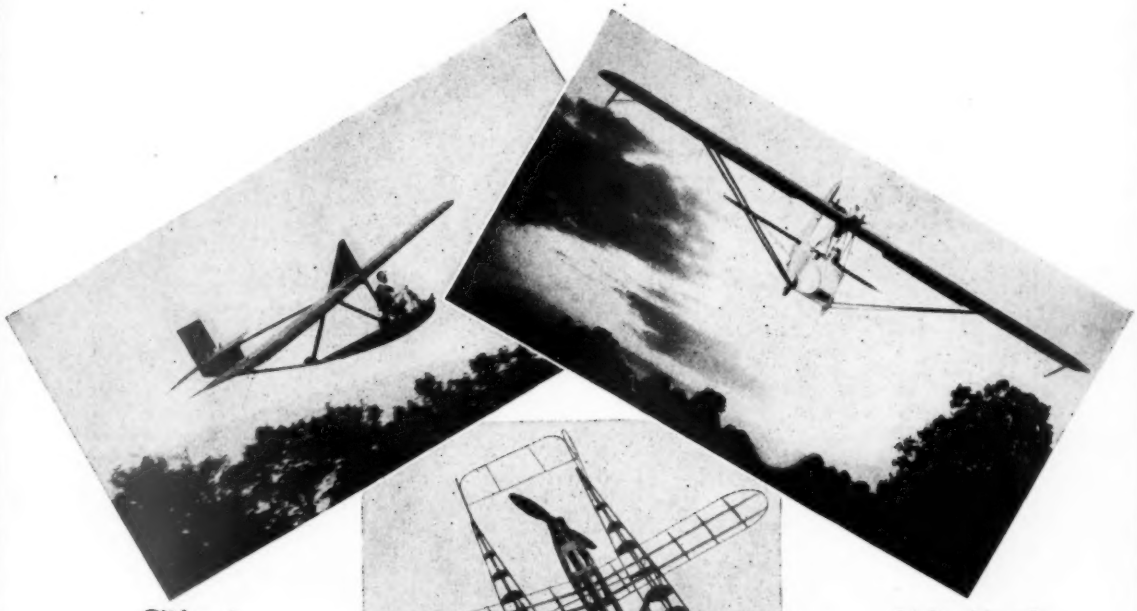

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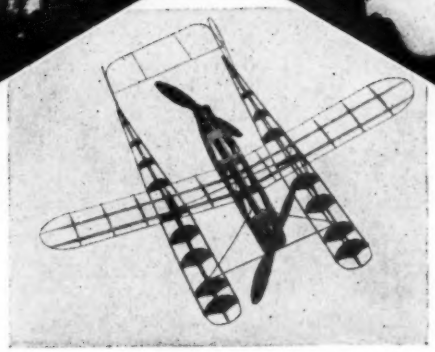

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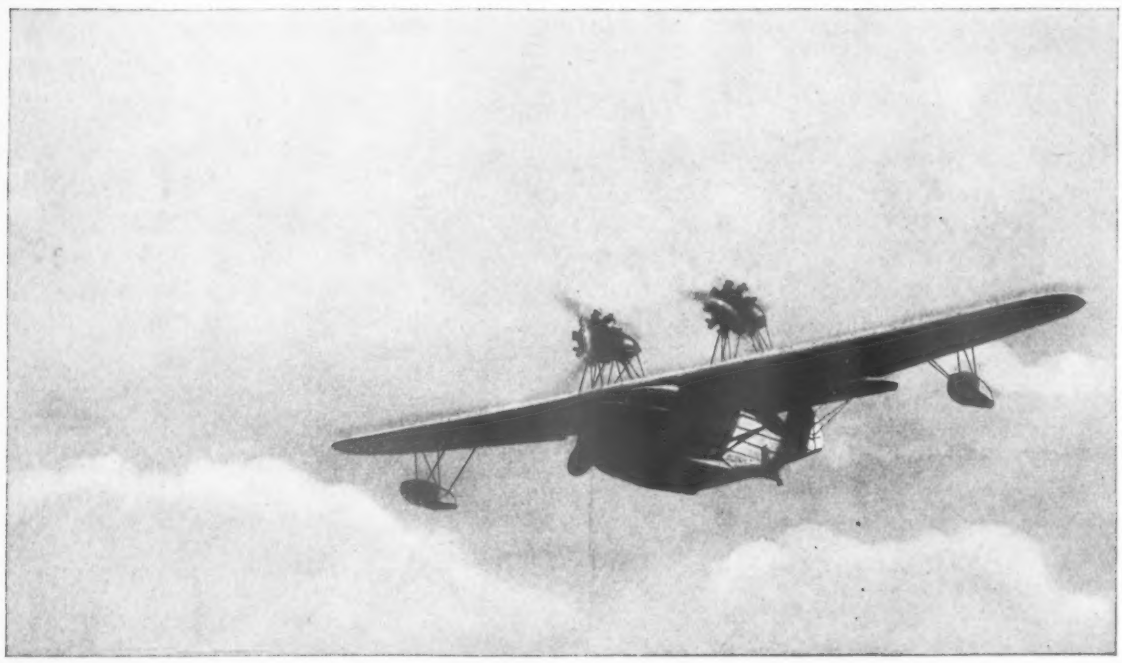

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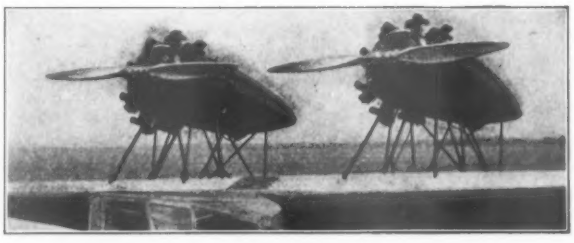

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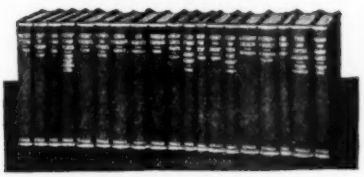

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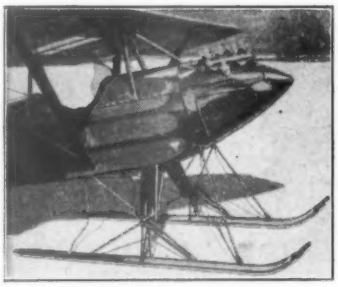

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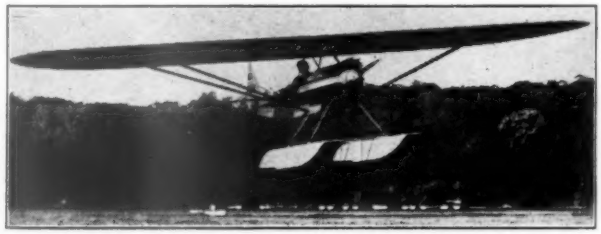

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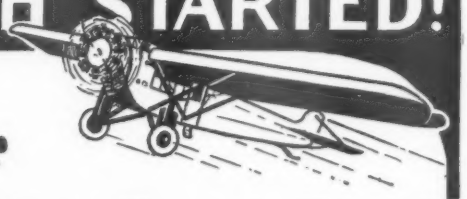

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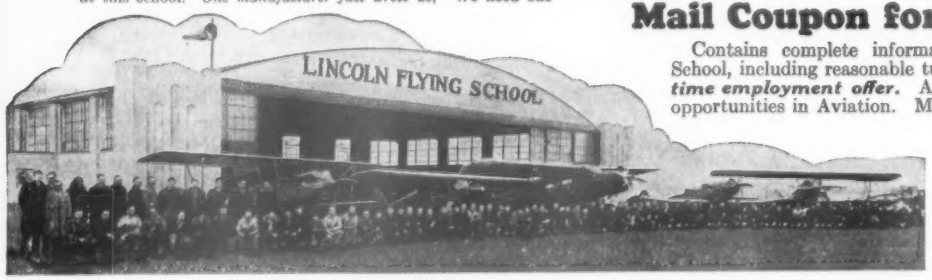

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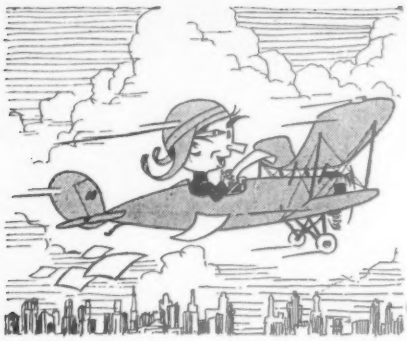
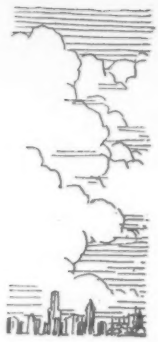


An Airy Chat *With the* Editor



SEVERAL weeks ago one of our foreign readers—I believe he was from Australia—wrote us about a new design in dirigibles. According to our informant, the British Government were planning to equip the R-100 and R-101 with pontoons so they might be safely flown over vast water distances. The idea being that expensive mooring attachments could be eliminated if the dirigible could land on water without danger of being blown over on its side.

As is our custom, we investigated this matter to its source. The following communication just arrived from the British Air Ministry:

"I am directed to inform you that no work on a design to equip a dirigible with pontoons has been commenced by this department, neither is such a design contemplated at the present juncture."

It is possible, however, that the recent R-101 disaster may have deterred our British airmen from going ahead with their plans. Or perhaps the information is premature, the British not wishing to disclose their experimentations.

IF you read POPULAR AVIATION from cover to cover you will by this time know that the French are working on a robot airplane. The plane can take-off, fly, and land entirely without human pilot. It can fly to any directed spot, take pictures, release bombs, or follow a multitude of commands. Radio is the magic force.

There is persistent rumor that the U. S. Government is also working on a robot airplane and have met with considerable success. We have tried to get some official word on this, either an admission or a denial, but so far without success.

The best we can offer is the dope given us by an army officer who generally keeps us up to the minute with Government news.

"Sorry," writes our informant, "but I can't get either photos or dope on the robot airplane. Not even a lead. I take it from answers to queries made by me with the Air Office officials that the War Department does not want to release any information concerning this project as yet."

CURTISS-ROBERTSON Airplane Manufacturing Co. of St. Louis, Mo., builders of the well-known Curtiss Robin, are working on a new light plane.

According to the whispering gossip, the new job will be a two-place little ship to sell for around $1,000. I guess that'll interest a great many of us.

I tried to get some more specific information from the manufacturer but they tell us that: "It is true we are experimenting with a light airplane but details covering performance, price, etc., have not been determined at the present time."

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ONE of the aviation magazines recently published an editorial casting serious reflection on the conduct of our Army flyers. The article said in part:

"If civilian transport pilots conducted themselves publicly as Army pilots commonly do, they would lose their jobs in just the time it would take the cashier to hand them their salaries. Taking a sociable drink with a friend or friends in private is one thing; getting drunk and making a general ass of one's self in public is quite another. It certainly reflects no credit on the Army, and does irreparable damage to an industry that is doing its best to build up public confidence in its stability, and a public belief in its high standards."

Major-General Fechet, Chief of the Air Corps, hastened to investigate the truth of this scathing denunciation.

It seems that there was a banquet in Los Angeles held to dedicate the Municipal Airport. Several army officers were there, not more than five, and the editor of the aforementioned aviation magazine also attended. 1200 people were there—and it was a gay crowd.

Army officials have denied that their men were in any way rowdy or "under the-weather." Others have inferred that perhaps the editor who wrote the article may not have been fully capable of recognizing which was which at the banquet.

As far as we are concerned, we weren't at the banquet. Liquor has been know to flow freely at aviation gatherings. Just who partakes and who doesn't is no doubt largely a matter of personal taste and opportunity.

A WELL-KNOWN flyer was in this office several weeks ago telling us about a deal he just completed for an aerial tour. He and his minor son will cover the airports along the border of the U. S. He is to get $50,000 from one company alone for the tour!

His original plan was a cross-country glider tour, stopping off at the capitol of each state. The father was to fly the glider; the young son to pilot the airplane. This tour was abandoned after Captain Hawks beat him to the publicity with the Eaglet.

THIS news comes to us from P. B. Burden, a reader of South Australia.

There seems to be considerable unemployment in that part of the globe. The sheep shearers were suffering along with the others.

A group of workless sheep shearers in a far North West Australian town were giving the officials considerable trouble. A rush call for reinforcements was sent to Perth, the nearest large city.

Perth loaded a giant 1,500 h.p. with 20 police and dispatched the load at full speed to the unsettled area. The conclusion of this story is probably already apparent. The reinforcements arrived in the nick of time!

ONCE upon a time there was a man who wrote textbooks on "How to Fly an Airplane." The author knew his aerodynamics inside out, but he had never learned to fly himself.

One day he decided to take off on a solo flight without having any previous actual training. He made a beautiful take-off, and immediately began to climb, at a proper angle. Suddenly, a couple of hundred feet from the ground, his plane went into a stall and crashed.

His trouble was simply this. He

(*Continued on page* 62)

POPULAR AVIATION

Combined With

Aeronautics

A magazine for everyone interested in Gliders—Lightplanes—Models

Volume 8 | JANUARY, 1931 | Number 1

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A MISSION TO HUNLAND

by

CAPT. JACK C. BURSEY

Illustration by Herman R. Bollin.

Masquerading as a Hun, Capt. Bursey deposits a spy behind the enemy lines. He knew in advance the return home would be hazardous. But he was not prepared for the deadly pitfalls that awaited him.

I HAD just returned from leave in London. That very evening I was summoned to the squadron office by my Commanding Officer.

He asked me to sit down. For a few seconds he gazed at me without speaking, and then said:

"Bursey, I am going to ask you if you are prepared to undertake a very hazardous mission. The Intelligence people have got a pet spy, and it is all-important that this spy should be somewhere in Germany by a certain date. More than that I do not know. It appears that the only chance of getting him to his destination in time, is to fly him across the lines and to dump him at a given spot in Hunland, the position of which I can show you on the map."

He looked at me inquiringly. I nodded, though I confess that the prospect rather filled me with alarm. But how could I refuse?

"I dare say it's not quite so fearful as it sounds," I remarked with forced cheerfulness. "Let's have a look at the map, and we might try to puzzle out some sort of plan."

The map was spread on the table, and the C. O. placed his pencil point upon a certain spot.

"That's the place," he said. "It's about sixty miles over, as you see. The spy knows that part of the country intimately; he says that he has lived there most of his life, and that he knows of a good hundred-acre field bounded on the eastern side of this stream which you see marked. The other three sides are bounded by woods. Here they are, marked in green.

"The man reports that the field has been under wheat, but that the harvest is in, and that the hard stubble should make a fine landing ground. The suggestion is that you should leave here in a two-seater tomorrow morning about an hour before dawn, so as to reach your objective just as there is enough light for you to see to land. There you drop your man and get back as quickly as you can."

"I see," said I.

"It's not the getting there that I'm worrying about. I know you'll manage that all right. It's the *return* journey that's going to be the tricky part of the problem. The Wing is sending over two flights of Nieuport scouts to escort you back. These planes will leave the ground shortly before dawn, and they should meet you somewhere between Cambrai and LeCateau. One flight will be at 6,000 feet and the other at 8,000 feet, and if you get into more trouble than you can handle, fire the usual red light, and they will come to you."

"The sun rises at 5:50 tomorrow morning," said the C. O. in answer to my question. "Allowing for a cruising speed of 65 miles an hour, and for a following wind of five miles an hour, I calculate that you should leave the ground just at 5 a. m. Now, Bursey, what do you say? Are you for it?"

I told him that I was—decidedly so.

THE matter settled, I left the C. O. to make the necessary arrangements to have the spy all ready on the field at 4:30 a. m., and went over to the sheds to inspect the old two-seater I was to fly.

Very carefully I went over every detail of the old crate with my Flight-Sergeant, rigger and engine fitter. Then suddenly I had a brain-wave. The chief danger which lay ahead of me was, as the C. O. had said, the return journey. It was practically certain that I should be seen on landing, and that, even if there did not happen to be any German troops in the vicinity, the alarm would surely be raised, and a telephone message to the nearest aerodrome would warn the Hun Flying Corps of my presence.

Then all the scouts in the area between my prospective landing ground and the trenches would rise like a swarm of wasps to intercept my passage home. But—if I were to carry German markings on my wings instead of British, then perhaps my early morning appearance over Hun-land would cause no untoward suspicions!

I called my Flight-Sergeant, and explained to him what I wanted. He, man of quick appreciation, understood, and a couple of hours later he reported at the mess and invited me to come and view his handiwork.

On the top of the upper and beneath the lower wings of every British aeroplane are painted the red, white and blue circles which proclaim its nationality. On either side of these four circles the Flight-Sergeant had fixed a strip of slotted wood, each strip pointing fore and aft. To the forward ends of these strips he had fitted rollers cross-wise. Tightly wound around each roller was a strip of fabric. I was about to examine these things when the Sergeant asked me to climb into the cockpit of the plane. I did so, and by the throttle lever he showed me that he had placed there a small wheel from which four thin wires led outwards through a conduit pipe.

"Just wind the wheel, please, Sir," he urged me. "That's right, sir, anti-clockwise."

I turned the wheel. In came the four wires. A few turns and the wheel would turn no more.

"Now make fast, Sir."

I obeyed.

"Now, sir, if you'll come and have a look." He moved off to one side. I joined him. He bent down. I followed suit. He pointed to the under surface of the right-hand plane.

"Is that O.K., sir?"

On the varnished fabric stood out an Iron Cross! A bright black Iron Cross such as the Fokkers carry! It was most ingeniously contrived and executed. By winding in the wires the Iron Crosses revealed themselves, and when the tension was released four springs pulled the fabric back upon the rollers, leaving British markings.

AT LAST came four o'clock. I got up and dressed and walked over to the squadron office with a muzzy head and legs of lead. The C. O. was there to greet me, and in a corner of the room sat a man. He rose as I entered.

"This is your passenger," said the C. O. "I'm afraid I can't introduce you to him with the customary formality. Our friend is nameless."

Heavily clothed in a thick blue reefer jacket, a pair of baggy trousers tucked into a pair of jackboots, his head and the lower part of his face covered with a woolen cap such as is worn by a devotee of winter sports, the spy approached me, holding out his hand.

"Mon Capitaine," he murmured, "enchante!"

He was an Alsatian by birth, it transpired. Hated the Huns with all his might, and knew every inch of the country over which we were to travel. He had lived in that area most of his life. He talked calmly of the task in front of us, so calmly that he seemed to take the whole thing as a matter of course, and a matter in which there could be no question of failure. This man's attitude coupled with a pot of steaming coffee which the C. O. had taken care to provide did much to revive my spirits. We discussed our plan of campaign in detail—that and other things until it was time to go over to the aerodrome.

A Nieuport and a Fokker, engaged in single combat. With a startling suddenness, the two fighting planes came together in mid-air with a sickening crash. They were interlocked in their death plunge.

It was five o'clock—still dark, but, as nights go, bright with a waning moon and a myriad of stars. Luckily there was no wind, so I merely had to fly by dead reckoning on my compass course. I waved to the men to pull the chocks away, waved again in farewell to the C. O., turned and taxied slowly from the sheds.

I asked my companion over my shoulder if he was all right, and he gruffly replied in the affirmative. A last look around—I opened the throttle and pushed the stick forward. The tail came off of the ground—we were charging across the field into the black obscurity of the night, and a few seconds later I knew that we were in the air.

Away we went, straight as an arrow for our goal. Our course lay E. N. E. By turning on the little electric bulb on the instrument board I was enabled to read the various indicators. With the throttle just over half open, the engine was giving 1200 revolutions, and running very sweetly. According to the air speed indicator, we were cleaving our way through the air at 70 miles an hour. The altimeter kept steady at 1000 feet.

After we had been going for an hour, directly below me I saw a stretch of landscape that was gloomily non-committal. No landmark gave an inkling of our whereabouts. In desperation I turned to the eastward and opened up my throttle, both my passenger and I intently searching the terrain below. Suddenly he grabbed my arm.

"There it is! Look! to the South!" he cried excitedly.

There, sure enough, slightly to the southward, lay the woods, the outline of which I had studied so carefully upon the map the night before. Down I went in a screaming side-slip, keeping well to the stream. When about 100 feet from the ground I kicked the rudder on and turned right. We slid in over the stream, and I pulled the stick back, we touched the ground and settled lightly on the stubble and taxied on across the field towards the trees. We stopped a few yards from them, my passenger dropped overboard, seized my hand, and with a grunted "Good luck" in farewell, bolted for the cover of the trees.

Quickly I turned about, and without bothering about the direction of the wind—there wasn't much to bother about—sent the plane streaking across the stubble. Within a minute or two of landing I was once more in the air.

"HOME, John!" I said to myself. But how best to get there? All remaining vestiges of the early morning mist had disappeared, and I was fully exposed to the view of the enemy, over enemy country, and a long way behind the enemy lines. Several of their aerodromes lay athwart my homeward path, and by now they would be up and ready for early morning patrols, so that I ran a serious risk of running into one of their formations.

Either I could remain at my present height of 300 feet and steer a zigzag course for the lines, thus avoiding all of the German aerodromes known and marked on my map, and by so doing I might escape observation in spite of the fact that there might have been a warning sent out to be on the lookout for me.

On the other hand, I could stick to my original intention, and fly straight back the way I had come.

It was this second plan which I decided to adopt. If I were to abandon my prearranged line of flight, I should miss the Nieuports which had been detailed to escort me home, and by keeping them hanging about in wait for me, I might involve them in a prolonged fight against superior numbers of enemy planes.

If they had started on time they would be now well on their way to the rendezvous, and if they had had clear sailing I should probably find them in the neighborhood of Cambrai or Le Cateau in 15 or 20 minutes.

On I flew. Ten peaceful minutes passed. No shot, no shell—nothing to disturb my homeward progress. But my mind was far from tranquil. It was extraordinary that I should be left thus unmolested. It was too good to last! Then, suddenly, I remembered! *I was still masquerading as a Hun!*

A feeling of disgust surged over me, unreasoned and unreasonable. Acting on an impulse of the moment, I released the wires which held the Iron Cross emblazoned shades in place.

If I were to get into a fight and be worsted, I would rather be brought down under my own colors. Supposing I had to make a forced landing in Hunland through engine trouble? And those roller shades were found affixed to my wings? A brick wall and a firing squad would be my lot by all of the rules of war!

Again, how would my friends know me if I flew towards them decked out with the enemies' insignia? I would be running a grave risk of being shot down by one of our own pilots!

The knowledge that I was now flying in barefaced defiance of the enemy seemed to stimulate my spirits. It was as if a heavy burden had been taken off my mind. For the first time since I had started out, I really began to enjoy myself.

As I approached the town of Auesnes I put the nose of my ship down and roared across the housetops at 50 feet. There were not many people in the streets but I saw the guard turn out in the main square. I waved a mock salute at them, and was gone.

A mile out of the town on the Cambrai road I overtook a formed body of troops, at which I let fly a few rounds from my machine gun just to make sure that I should not escape their notice. Whether they responded or not, I did not wait to see, but on looking back over my shoulder I found that most of them had taken cover in the wayside ditch!

THINKING that the Nieuports should now be somewhere close, I began to search the heavens above and in front of me. Several miles to the westward, and at a height of about 6,000 feet, black puffs of anti-aircraft shells were seen exploding, a certain indication that there was a British fighting squadron in the upper air.

Sure enough, out from the smoke-drifts there suddenly appeared in wedge formation, two groups of aeroplanes—five to each group. The Nieuports!

I scoured the skies to find the enemy planes. Yes! There they were! A swarm of some twenty German Fokkers, flying fast towards the British scouts. Another few seconds and the opposing flights had met.

Instinctively I put my ship into a climbing turn and kept it there, straining my eyes to follow the fortunes of the fight. Round and round they whirled, Nieuports and Fokkers, in and out and around each other—in the melee it was impossible for me to distinguish friend from foe.

Then came a reminder that I was in the battle area. A series of sharp cracks sounded from behind me above the roar of my motor. I looked round to see where the burst of fire had come from and found a Rumpler two-seater sitting right on my tail. How he missed me with that first burst, I shall never know, but he *did*, and that's what counts.

Instantly I swung my ship into a zigzag course, preventing any further shooting and finally my friend the enemy made a mistake. Just a slight mistake, but it cost him and his gunner their lives.

He turned the wrong way, and instantly I whipped my ship around and found an excellent target. The enemy ship was banked over steeply and turning away from me, and I easily got him in the center of my sights and pressed the trigger control of my guns.

I don't suppose more than 40 rounds of ammunition spewed forth from my guns, but it was enough. At the close range from which I fired—about 30 feet—I couldn't miss, and I was rewarded with seeing black smoke gush forth from the Rumpler's cockpit—black smoke which quickly became brightened as the flames of the burning gas and oil spread.

Down the ship went—hurtling headlong in a mad, crazy descent to the earth 3000 feet below. I watched them crash, and then turned my attention again to the battle raging upstairs. It had resolved itself into little groups of twos and threes and fours. It was a case of each man for himself.

And then—circling, twisting, turning, quickly losing height two machines

(*Continued on page* 65)

Stunter Finally Meets Fate

SCHINDLER of Berlin, the great aerial stunt performer, was recently killed in an accident that destroyed two planes and cost four lives in all. The crash occurred while he was descending a steel ladder from a biplane to another plane flying below it. The upper plane suddenly lurched downward and the crash followed.

Here he is shown doing one of his daring stunts.

Dumb Students Earn Dumbbell Trophy

THERE is one trophy at Kelly field, San Antonio, Texas, for which there are no aspirants and for which no contest is made. The trophy is a heavy dumbbell.

The club is patterned after the famous Golden Dumbbell Club of Kelly field, composed of officers who have made flights and manipulated their planes in an unexplainable and unauthorized manner without serious injury to any one.

Membership in the club is involuntary and the selection of the "honoree" depends upon the perpetration of some "boner" on the part of the pilot. One member was initiated after he had taken off down wind, while another gained the uncoveted bell when he landed down wind. A third received the award when he landed for fuel and then took off again without turning on his gas supply.

The club was organized by Capt. John K. Cannon, senior instructor in pursuit aviation. The qualifications of the members are passed on by the instructors.

Recently the club was presented with a new trophy, a brass dumbbell to replace the wooden one in use when the club started. The custodian of the trophy wears it around his neck, suspended from a chain, during the time he is on the line. He may take it off when flying. The trophy is the property of the "bonehead" until some one of his mates does something wrong to bring himself to the attention of his instructors.

Trucks Not Allowed

THE following amusing incident which occurred at Friedrichshafen, Germany, illustrates the tremendous size of the giant flying ship DO-X.

An eight-hour experimental flight of the DO-X carrying 168 passengers was scheduled, and as usual when important events are to take place, a newsreel crew was present to make some "shots" of the flight.

The preliminary arrangements were made—passes issued and a sufficient number of persons denied passage to compensate for the weight of the camera and sound apparatus (200 pounds allowed per person).

The entrance to the plane is through a rather large double door, and the cameraman not wishing to carry his heavy apparatus quite a distance from the roadway to the location of the plane, had the truck back up to the plane entrance.

The man in charge of the plane, a huge German, came rushing up to the cameraman greatly perturbed.

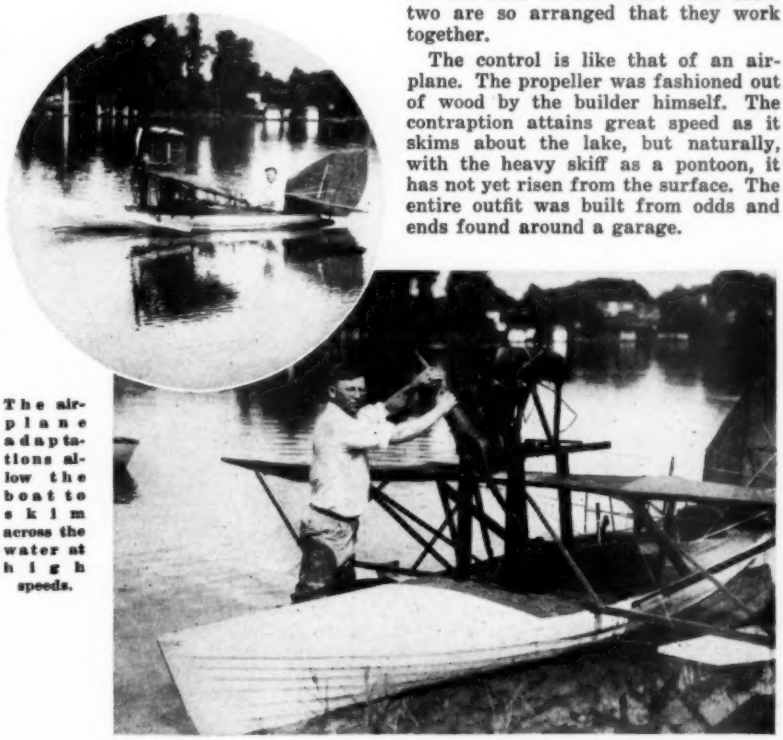
"Please, Mr. Movieman, please don't. For you and the other man, it is alright. For the apparatus, it is also alright. But, please, Mr. Movieman, do not ask to bring the truck; it is not allowed!"

Rowboat Equipped With Airplane Controls

AN ELECTRIC lineman has fashioned a flying boat that has given him much pleasure. It is made over from a sixteen-foot skiff and powered with a two-cylinder motor cycle engine.

The wings are built after the design of biplane wings, and the engine is mounted above. There is an air rudder, like that on a plane, and also a rudder for the skiff in the water—and these two are so arranged that they work together.

The control is like that of an airplane. The propeller was fashioned out of wood by the builder himself. The contraption attains great speed as it skims about the lake, but naturally, with the heavy skiff as a pontoon, it has not yet risen from the surface. The entire outfit was built from odds and ends found around a garage.



The airplane adaptations allow the boat to skim across the water at high speeds.

Immense Light Brightens Roosevelt Field

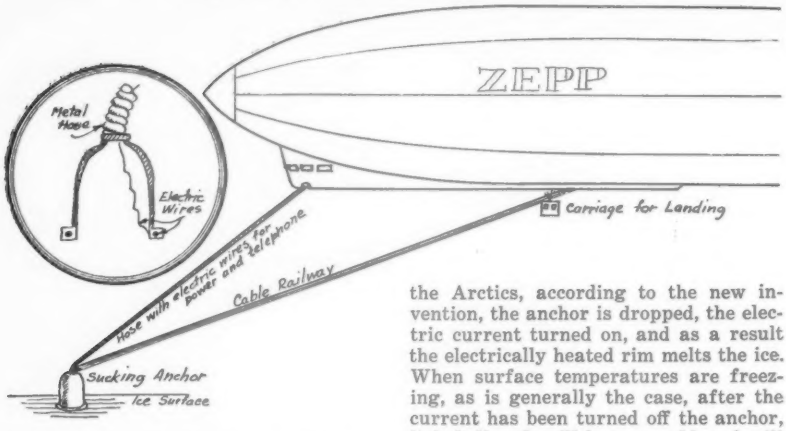
THIS picture will give you an excellent idea of the size of airport floodlights.

A Sperry 1,000 m.m. floodlight is shown at Roosevelt Field in a specially built tower. On the roof are Sperry Ceiling Indicator, Sperry High Intensity Searchlight and a double beacon which casts a red and a white light.

This equipment makes Roosevelt Field the best lighted airport in the East.

XUM

Unique Device Will Anchor Zeppelins



ONE of the problems to be considered in dirigible exploration of the arctic regions is that of landing when anchor masts, ground crews, and so forth, are not available.

Hans F. Kutschbach, a German inventor, to overcome these difficulties, proposes the use of a vacuum anchor, consisting of a metal bell-shaped device in the rim of which is an electrical resistance coil. A metal cable connecting the anchor and Zeppelin contains both telephone and power wires, and in the center an air hose.

When a dirigible wishes to land in the Arctics, according to the new invention, the anchor is dropped, the electric current turned on, and as a result the electrically heated rim melts the ice. When surface temperatures are freezing, as is generally the case, after the current has been turned off the anchor, it is believed, will become cold and will become frozen in the ice.

If necessary, during this freezing operation, a vacuum pump in the dirigible will draw all the air from the bell-shaped anchor through the center air hose, so that the vacuum thus produced will also aid in anchoring the dirigible.

The inventor also proposes that the anchor shall hold a carrying cable for a traveling basket to transfer material and persons from the airship to the ice and vice versa. This connection would be made to a central point of the ship, not to the ends. The inventor believes that, with such a connection, squalls could not drive the airship onto the ice but, on the contrary, the heavier the squall, the higher the dirigible would be lifted.

French Government Offers Free Scholarships

EACH year the French government offers scholarships to Frenchmen between the age of 17½ and 20½ who are either unmarried or widowers without children. Every eligible candidate after filing his application must take examinations in certain subjects, including a French composition on the development of aviation, French history and geography. He must pass a physical examination satisfactorily. From these candidates the Minister of Air will choose the successful winners.

The scholarships provide for preliminary flying instruction at a private aviation school, which the student has the privilege of choosing, and for an eleven-month course at the Military Aviation School at Istres. All expenses including tuition fees at the civil aviation school as well as traveling expenses, are paid.

The student is given free board and lodging, a bounty of three francs per day during his entire attendance at both schools as well as free medical attention and insurance against sickness and accidents, even those resulting from the operation of planes.

If the student successfully completes the course, he is given a diploma stating that he has received full instruction in aviation and navigation and has fulfilled all requirements for a government licensed pilot.

Man Uses Balloon To Walk Across Water

MANY schemes have been devised to allow man to walk on water, but here is a brand new one. It was successfully tried out at Venice, Cal.

This water grasshopper is Herbert McFall. With a little care, and buoyed up by a balloon (designed by A. F. Godefroy), Herbert seems to be doing right well.

Famous Flyer Performs Square Loop

LIEUTENANT Alford J. Williams, former navy racing champion, took a Curtiss-Hawk biplane over Roosevelt Field, Long Island, recently and put it through several "square loops."

This is an unusual stunt performed by driving a plane directly up for 1,000 feet, then on a line for the same distance and breaking from that into a 1,000-foot dive. At the end of the dive Williams was moving at about 200 miles an hour.

Heinen Air Yacht Meets With Accident

OUR readers will remember the Heinen Air Yacht which was described in last month's issue. This little family dirigible was built to sell for $10,000.

Since this description was published Capt. Heinen met with an unfortunate accident. The newspapers heralded the accident as a very serious one, but in reality, however, the accident was minor, the damages amounting to only 1/10th the value of the ship.

The Heinen air yacht had just completed a successful flight to Toms River, N. J., and was preparing for the return trip to Cape May.

As the engine was being started, a starter air tank explosion occurred. The explosion resulted in the damaging of one cylinder head of the engine; it further damaged the instrument board and the gondola considerably, but did not damage the gas bag (hull).

One slight cut in the air compartment of the hull was discovered, but was of no importance. The fire, which followed the explosion, was extinguished in a fraction of a minute and did not cause any damage to the bag, nor to the lifting gas.

This accident prevented the return flight of the air yacht to Cape May under its own power, and Capt. Heinen decided to deflate the gas bag, in order to transport the ship to Cape May by truck for repairs.

A new engine and new starting equipment will be purchased; a new gondola, including some instruments, will be manufactured. As soon as all this is done, the air yacht will take the air again.

This accident was not due to any fault in the construction of the air yacht, nor to any fault of the crew which intended to start the engine. It was due to a faulty ball of the check valve in the airline leading from the air tank to one of the engine cylinders. Due to the sudden change of weather, a considerable amount of priming was done, in order to facilitate the starting. Due to this faulty ball, gasoline vapor got into the air tank and by turning on the ignition switch the explosion followed.

The Author.

Tricks in Handling Amphibians

by ENSIGN LAWRENCE A. CLOUSING, U. S. N. R.

It is no cinch to fly a Navy "duck." Lieut. Clousing, an experienced pilot, found this out when he pulled some embarrassing boners.

THE utility squadrons of the United States Navy use Loening amphibians a good deal in their work. During the course of my time flying in a utility squadron I have learned a good many tricks of amphibians and have witnessed some of the interesting antics they have performed.

One day one of the pilots in the squadron was taking up another flyer who had never before been in the Loening plane. He was going to show him what they were like and how they landed. Taking off from the water he proceeded happily on his way toward a land field a little ways inland.

Coming over the field he circled, and noticed that there were other members of the squadron there at the field practicing landings in amphibians, but that they were now alongside of the field taking a smoke between hops. They all waved profusely as he went by, and he waved merrily back—the Navy is a great sociable institution, and one is always glad to greet another member. So he went down to the end of the field; turned into the wind, and made his approach.

All went fine; the approach was excellent; the plane was settling down nicely for a perfect landing, when all of a sudden there was a scrunching and a grating, and the plane jolted to a sudden stop. The wing tip float on the left hit the ground with a thump, and there was the plane, a stranded seaplane, high and dry on hard, rocky ground! The pilot had forgotten to put the wheels down!

The friend in the back seat had thought, while the scratchy landing was in progress, that the landing gear must have been awfully frail to have given way under such an easy landing.

Strange to say, the plane was not in the least damaged. Some of the paint had been scrapped off the bottom, and the sealing wax that is placed over the screw heads was melted out of place as a result of the heat generated by friction. The wing tip float was cracked a little at the bottom, but otherwise all was OK.

Some of the other pilots at the field flew back to the squadron hangar; obtained spades and pick axes; flew back to the field, and there all set to work digging holes on either side of the hull. When these were deep enough, the wheels were lowered; the engine started, and the plane taxied out of the holes.

Then placing the spades back in the plane, all took off and returned, landing on the water in front of the hangar none the worse for the experience. If the pilot had at this time landed in the water with his wheels down, it would have climaxed the day, but he didn't do it then; he did it later, as did others in the squadron. In the next few days the pilot in question was surprisedly presented with a flying jackass medal for his demonstrated flying ability.

They tell a story about one of the Navy pilots who was delivering an amphibian from the factory to one of the air stations. So cautious was he, and so anxious was he to be prepared for any emergency, that every time he flew over a river or lake he would roll up his wheels, and then again when he came over land he would roll them down again.

Now this represents work, and of course, no one cares much for work, and so when flying an amphibian, pilots usually leave the wheels up over both land and water if they are up at a sufficiently high altitude. Thus the wheels can be readily lowered long before the plane would ever come to earth in a forced landing on land. If one is flying over rough country it may be advisable in case of a forced landing to leave the wheels up anyhow as such a landing would probably result in less damage than would one made with the wheels down should the plane bounce in the rough, or nose over, or roll along a short field into a tree.

I HAVE known of numbers of other cases where Loening amphibians have landed in water with the wheels down, but only once did any damage result. That was in a landing made in a loggy plane on a calm day on glassy water.

In this case the plane went way up on its nose, according to the pilot, just like it was going to go over. But it didn't. However, the severe strain broke the members in the forward part of the hull, and buckled the sheet metal covering. The pilot did not know of this damage, and blissfully flew back to the squadron, happy that no one had seen him pull the stunt.

He stepped out of the plane, and calmly signed the yellow sheet as required of pilots in all naval flights, saying nothing. Then one of the other pilots noticed his wet trousers, and made him confess. By this time the plane captain had seen the damage inflicted, and so our pilot's little trick did not go unnoticed that day.

One day I saw one of the pilots coming in for a seaplane landing with the wheels down. I happened to be in a plane on the water at that time myself, so I taxied about in the area in which this plane was to land, waving my arms, and gunning the plane, cutting it first to the left and then the right. The other pilot realized something was up, and so pulled up not landing. As he sped away to come around again I saw his wheels go up.

Perhaps one of the most unexpected landings was one I made with a Loening amphibian one day when checking out for landings aboard the aircraft

Right, a Loening Navy type amphibian on the apron at the squadron base. The author is standing on the left with another officer. Below, the same plane in flight with wheels up.

XUM

carrier Lexington. It all happened absolutely unexpectedly for me.

I had taken off the deck of the ship with the amphibian or "duck," which latter name describes them perfectly, and had come around to the stern of ship several times making approaches for landings aboard. You draw right up to the ship, getting ready to settle on, when you give it the "soup," and go on. This is done for practice when one has not landed aboard the carrier for some time, and allows the pilot to get familiar with the procedure again.

The passes went off fine, and I was signaled from the ship to come in and land aboard. I was planning to make this landing one of the best landings I had ever made aboard the carrier in my life. I had made landings aboard the carriers before in other types of planes, but never in a Loening amphibian. And Loening amphibians are a clumsy appearing plane, and appear to be harder to land than other types. Nevertheless, I had flown them a good deal before, and was thoroughly familiar with their qualities. Getting too familiar with them as a matter of fact.

So I was going to make this the best carrier landing of my career. I came around in the circle some distance behind the ship, and was getting all squared away for my approach, slowing the plane down, so that it would not be going too fast as it got near the ship.

My head was over the side intently watching the deck of the ship for signals. Everything seemed to be going fine, and I was drawing close enough to distinguish people clearly when I had an uneasy notion I was going a little too slow.

Glancing inside quickly at the airspeed meter, and at the same time shoving forward a bit on the throttle, I saw the meter read 40 knots, the lower limit of speed for a Loening. By this time there was no notion about it; I was squashing down.

I jammed the throttle wide open, and the engine roared, but it was too late. I had exceeded the stalling angle, and the plane was going down, though the engine was full on.

Before I knew it I was on the water having unintentionally made one of the prettiest rough water landings imaginable. The plane had very little forward speed, and its downward speed had been checked by the full engine power, so that when I hit it was just about at that stage where I would have regained flying speed, had not the water come along first.

It was rough water too, and my wheels had been down. Due to the slow speed of the plane at that moment it had little tendency to nose over.

Most surprised were those aboard ship, who expecting to see the plane come aboard in just a few seconds, instead saw it reposing peacefully afloat on the water.

On the water, I rolled up the wheels; looked over the plane to see that no struts had buckled or flying wires snapped; rolled the wheels down again to see that nothing was binding, and then rolled them up and took off cross wind.

It was so rough that many a seaplane would have been unable to get off. It would have been most jarring and almost destructive to take off into

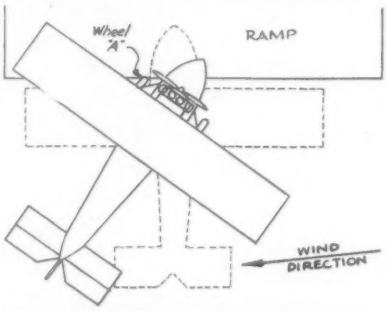


Fig. 1. This position will deceive the uninitiate. The engine must be applied; wheel "A" will remain steady until plane swings into proper direction.

the wind and huge swells and choppy waves. It was possible, however, to get the plane on one of the swells and follow it down, taking off cross wind and even slightly down wind, as the swell is moving down wind as you follow it.

Once again in the air, I rolled down my wheels; made an excellent approach, and made a landing on deck such as I was hoping the previous one was to be.

"What was the trouble?" shouted the air officer above the noise of the engine.

"I spun in from 80 feet," I joyfully replied, happy that it had not the disastrous ending that most stalls have when started at an altitude of 80 feet.

ANOTHER funny incident was a take off from the aircraft carrier, Saratoga, made by one of the amphibians.

It had taxied up into place aboard the ship ready for the take off. All seemed well enough, although some later said the engine seemed to have sounded as though the spark was retarded. But the officer in charge gave the signal for the plane to take off, and so the pilot gave it full gun, and down the deck the clumsy duck ambled.

When it got to the end of the deck it was apparent that it did not have enough speed to stay in the air, and so down it went, not in a direct dive to the water, but in rather a steep glide. All eyes strained in the direction of the plane, and just as it got to the water it leveled out, seeming to almost have flying speed.

There it fought for a few seconds. The tail skag went in and came out again, while the plane struggled to stay up. Then along came a bigger wave, and it reached up and swished around the wheels, pulling the plane down.

You might call that, "Off the Carrier and Into the Drink" instead of "Out of the Frying Pan and Into the Fire." If that had been a land plane it would have been less of a joke. But here the pilot again coolly rolled up the wheels, and giving the engine the gun, took off.

Such things as these are what make the amphibians of the Navy the most joked at planes in the outfit. They call them "ducks" and "Aimees," the latter because they can take off the sea and land on the desert even as did someone else.

When they land on the deck of the carriers there is a whooping and hollering of "heads up," "watch yourself," and yet invariably they land without trouble, even though they do look like they are to bust all to pieces. They are such awkward appearing things.

Yet those who have flown them a good deal have learned to like them, just like one learns to love a homely but kindly and intelligent dog. Wherever you want to go an "Aimee" will get you there.

If you should wish to land in a very short stretch of water, merely put the wheels down. The plane, upon touching, will stop before you can say "Jack Robinson." If you are flying over a city and your engine should conk, you can land it in the city reservoir or a children's wading pool, provided it is empty of kids.

IF YOU are taking up a ramp with the wind from the side, you may be deceived in making your approach, as many a pilot has been deceived. His approach is probably on a diagonal, and as his wheels touch the ramp he throttles down because he is afraid that the plane will go along the runway diagonally and not straight up as wished.

This is just what he should not do. He should give it plenty of motor to straighten the plane out and head it straight up. Applying the throttle will do this as it will pull the amphibian around till both wheels touch the ramp, and then the plane will go right up. (See Fig. 1.)

On coming into a runway with a tail wind blowing, many pilots, though thoroughly experienced, are deceived, and have difficulty in heading it directly onto the runway. With the wheels rolled down, the plane speed through the water is considerably less than the speed of the wind sometimes.

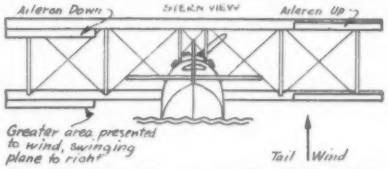


Fig. 2. A view from behind. The wind strikes the downturned ailerons and swings the plane to the right.

Therefore it is hard to keep the plane headed directly forward. However, if a pilot will remember that ailerons can be of great use in directing a plane on water, he should have little trouble.

With the wind from the tail, by moving the wheel or stick just exactly the same as one does to make a turn in flight, the ailerons will aid in turn-

(*Continued on page* 56)

Some British Surprises

BRITISH air wonders are to astonish the world this summer. Large numbers of machines that for some time past have been on the secret list are to be shown at the International Air Exhibition to be held at Olympia, in London.

And the most interesting of all will be a tiny machine that fits into a submarine.

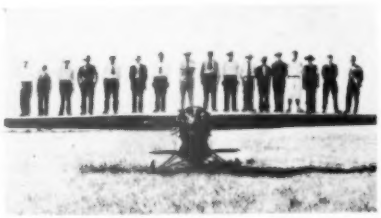
The public generally are not aware that for some time past small machines have been carried inside British submarines. By an ingenious arrangement the big turret that hitherto has been used for the accommodation of a powerful gun is converted into a hanger for the air machine craft.

The pilot, who, as one of the submarine crew, has been journeying for long distances below the surface of the water, is thus able to take the air for scouting purposes without preliminary detection.

There is no more novel development of air fighting than this, but the technical problems involved are considerable.

The machine that is to be shown is a Parnall Peto fitted with a Genet engine, and no aircraft at the exhibition is likely to excite more attention. In the past there have been speculations often as to the possibility of making submarines that will fly, but the Peto shows that a much more satisfactory method is to make the underwater boat an aircraft-carrier.

In addition, there will be seen at the Olympia a large number of quite new machines that have been kept closely guarded from prying eyes up to the present. They include land and sea fighters of remarkable performance, single and multi-engined bombers of new type, special home-defense machines, flying-boats, etc.



Wing Holds 17 Men

TO DEMONSTRATE the strength of the unstrutted wing of his monoplane, Clyde V. Cessna, Kansas, old-time airplane builder and pilot, put 17 men on it.

The wing, braced internally by the cantilever method, is far thinner in the center than the conventional type. No strength was sacrificed in reducing the thickness. The wing showed no appreciable sag under the load.

The Cessna ship, said to resemble a bird more closely than any other plane, is capable of a speed of 150 miles an hour with a Wright Whirlwind motor.

New Sportster Offers Trim Design

THE "Winged Bullet" is a low winged monoplane powered with the Warner 110 H. P. motor. This plane is manufactured as one or two place. Motors from 100 to 165 H. P. are adaptable to the "Winged Bullet."

This supersport monoplane is especially adaptable for racing and sport flying. The minimum safety factor is 12.4 and sturdiness and safety are embodied throughout in the design.

The "Winged Bullet" has taken off with pilot and parachute weighing over 200 pounds and 35 gallons gas (217 pounds) in 603 feet and 8½ seconds. The price of the "Winged Bullet" with Warner Scarab 110 H. P. motor is $9,500.

Specifications SR-4

Length overall	20' 9"
Height overall	6' 7"
Wing span	24' 1"
Chord	54"

Performance

High speed	155 M. P. H.
Landing speed	55 M. P. H.
Ceiling	9,000 ft.
Cruising range	600 miles

The companion ship to the SR-4 (Winged Bullet) is the Kinner-powered SP-7 sport monoplane priced at $3,945.

16 Cylinder Motor Built in England

THE new sixteen cylinder air-cooled Napier engine created such great interest on its first appearance at this year's Air Display in England. This new engine has received the official name of "Rapier."

This engine is likely to revolutionize commercial flying, as it has all the advantages of other air-cooled engines of high power, without the great disadvantage of a big head resistance. Faster aircraft can, therefore, be obtained without additional horsepower.

The Ten Greatest Feats in Aviation

"TEN Outstanding Feats of Aviation" were recently selected by a Paris paper. These, listed in chronological order in the opinion of the paper were:

First recognized flight of Ader	1897
First flight of Wright	1903
Flight over the English Channel (Bleriot)	1909
Flight across the Mediterranean Sea (Garros)	1913
200 kilometers (about 110 miles) per hour (Prevost)	1913
Flight from Paris to Dakar (Bossoutrot)	1919
Flight from New York to Paris (Lindbergh)	1927
Flight across the Pacific (Kingsford-Smith)	1928
575 kilometers (345 miles per hour) (Orlebar)	1929
Flight from Paris to New York (Costes and Bellonte)	1930

New German Plane Has Tail in Front

A NEW German foolproof airplane, the Focke-Wulf "Ente," carries its tail where an ordinary monoplane carries its engine. Its forward stabilizer protrudes twenty-one feet in front, gives the appearance in flight of backward flying, as if it were chasing its tail through the clouds.

When taxiing along the field, the name "Ente," meaning duck, becomes apparent. With the forward stabilizer scooping the grass, the plane looks exactly like a big duck, with outspread wings and outstretched neck, running along and scooping the grass top with its bill.

When landing, the brakes can be pulled abruptly without upsetting the plane, owing to the queer "beak" of the "duck" plane. This permits landings on much smaller fields than the ordinary.

It is powered with two 75 h.p. motors. Later, after the tests have proved its worthiness, larger sizes will be built. The constructors claim that the plans for this plane were made in 1908.

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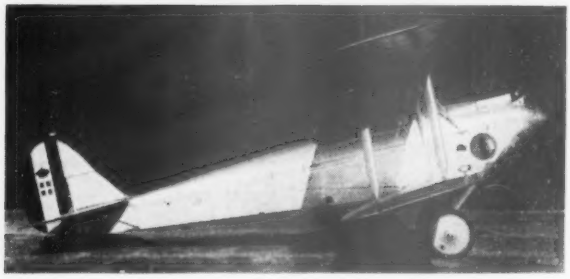
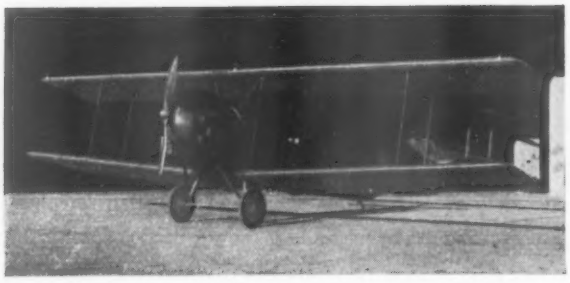
The Light Planes *of* Italy

Current Italian designs that answer the world's demand for light aircraft





Top, Romeo Ro 5. *Middle*, Caproni Ca 100. *Bottom*, Machi M 70

Breda 15

Top, Piaggio P. 9. *Middle*, Fiat A. S. 1. *Bottom*, Cant 26

SPECIFICATIONS OF ITALIAN LIGHT AIRPLANES

Make	Type	Span, Ft.	Length, Ft.	Height, Ft.	Weight Empty, Lbs.	Useful Load, Lbs.	Maximum Speed, M.P.H.	Minimum Speed, M.P.H.	Engines (Optional)	
Breda 15	Monoplane	36.8	22.2	8.3	926	617	112	40	Walter, 85 h. p.	Colombo "S53", 85 h. p.
Caproni Ca 100	Biplane	32.8	24.0	8.11	926	617	102	40	Gipsy, 85 h. p.	Isotta Fraschini, "Asso. 80" R. I., 100 h. p.
Fiat A.S.1.	Monoplane	34	20.6	8.3	827	617	99	40	Walter, 85 h. p.	Fiat "A. 50", 90 h. p.
Romeo Ro 5	Monoplane	32.8	22.9	7.1	882	617	109	40	Walter, 85 h. p.	Fiat "A. 50," 90 h. p.
Cantiere Navale Triestino Cant 26	Biplane	32.8	23.0	8.8	925	617	97	37	Cirrus, 80 h. p.	.....
Macchi M 70	Biplane	32.7	23.2	9.7	1017	617	97	34	Cirrus, 80 h. p.	.....
Piaggio P. 9	Monoplane	42.1	28.8	8.11	1187	617	90	46	Cirrus, 80 h. p.	.....
Bonomi	Monoplane	39	21	6.7	782	484	94	.....	Genet Armstrong, 80 h. p.	Farina "Alloth," 85 h. p.

Pilots Must Be Good Bicycle Riders

PILOTING an airplane isn't all a man must know to fly the Seattle-Alaska route—he must also be an expert bicycle rider! Planes flying from Seattle to Ketchikan and points north must stop at Alert Bay, on the northern tip of Vancouver Island, and the pilot must visit the customs office to have his papers signed. It is three miles from the dock, where the seaplanes land to the customs office, and Canadian officials have provided a means of transportation—a bicycle—for the airmen.

The usual procedure in the flight for the northland is this: The plane is flown from Seattle to Alert Bay and taxied to the dock. The pilot climbs out, hops on the bicycle and pedals over the rough, three-mile course, has his papers signed and then starts back to his plane.

Some of the pilots have expressed the opinion that the most hazardous part of the Alaska flight is that six-mile bicycle jaunt. There has never been a forced landing of planes, but pilots have had several forced landings from the two-wheeled bike.

Business Man Flies 365 Days

John D. Brock, new record maker.

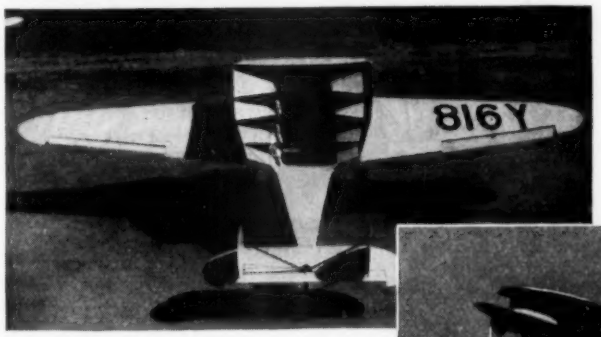
THERE is an altogether new aviation record being made in Kansas City: A flight every day for a year—365 flights on 365 days—regardless of storms and wind, snow and sleet, rain and what not.

Dr. John D. Brock of Kansas City is the flyer, a wealthy man who does his own piloting and flies for pleasure and business.

Dr. Brock has a transport pilot's license. His flying experience dates back to the early days in aeronautics when the pusher type airplane with its piano wire and bent nail bracings predominated.

The final flight of the year's record was made on Saturday afternoon, November 15. Just how long Dr. Brock will extend this record of a flight a day is not known. His intention is to continue indefinitely and if his determination in the future equals his determination of the past year, the record will go on into his old age.

Unique Craft Has Remarkable Lifting Ability



Left, a view of the Lanier plane showing the High Lift Cell which is largely responsible for the performance of the ship. Below, the X-L-2 in flight.

THE following very interesting information came to us from E. H. Lanier, who has been engaged in experimental work at Lunken Airport, Cincinnati.

Mr.Lanier, who first invented the ice cream cone, has been working for two years on a foolproof plane of his own design. He constructed two ships, X-L-1 and X-L-2, the latter now undergoing trial flights with remarkable results.

According to the designer, this ship will be far safer as a sport or training ship than any ever built.

The natural inherent stability with almost vertical descent is due to a new form of lift located on top of the fuselage over the center of gravity. This high lift cell or vacuum chamber has over twice the lifting power of ordinary wings at any speed or in any direction.

The X-L-2 is powered with a LeBlond 85 h.p. engine and has a cruising speed of 50-65 m.p.h.

During trial tests, the Lanier plane has landed in 20-ft. space, and took off at 32 m.p.h. after a run of only 100 feet.

In the photo you will note a high lift cell, open top, hollow form inside and lateral air buffers creating an area of low pressure when in motion.

The cell is located longitudinally along the top of the fuselage, the entering edge or nose extending well forward over the engine, the trailing edge half way back on the fuselage and laterally over the air channels.

The full Cantilever wings are spaced apart from the fuselage, forming two air channels, one on each side of the fuselage—permitting air currents to pass through the plane verticaly, horizontally or in any direction the plane is moving, producing exceptional lift, positive lateral stability and preventing side slip.

Vanes on the inner ends of the wings prevent air from entering the area of low pressure on the wings when in flight.

The high lift cell, at any speed or under any conditions, is lifting considerable more than one-half the entire weight of the plane and is highly efficient at slow speed, when the wings are least efficient, as in landing—due to the retarding effect of nearly vertical suction.

Actual flying tests of both the X-L-1 and X-L-2 proved that when purposely skidded or slipped the ship assumes a bank or an even keel—as the case may be. Turns made with rudder only—plane banks in the right direction and when straightened out assumes an even keel without using the Ailerons.

Specifications X-L-2

Length over all, 22 ft. 6 inches.
Gross weight, 1,440 lbs.

Wings

Type Goetenger Sec. 387.
Span, 25 feet.
Chord, inner end, 7 feet.
Chord, outer end, 3 feet 6 inches.

High Lift Cell

Type open top hollow vacuum chamber.
Width at top, 8 feet 10 inches.
Chord, 11 feet 3 inches.
Depth, 2 feet 10 inches.
Width at bottom, 2 feet 6 inches.
Weight of all material in high lift cell, 80 lbs.

Instrument Manufacturer Learns to Fly

ELMER A. SPERRY, JR., inventor of the Sperry Artificial Horizon and many other gyroscopic instruments, is an airplane pilot himself now.

On his way from his summer home at Bellport, on Long Island, to his office in the Sperry Building, Brooklyn, the engineer passed the Curtiss-Wright field at Valley Stream. Without informing his associates he began taking flying instruction, and after three hours and four minutes of it he soloed.

In his characteristic way Mr. Sperry denies that the short period of instruction before his solo flight is remarkable, pointing out that the thousands of miles he has flown in airplanes as a passenger made actual piloting easy for him.

XUM

OCEAN FLIGHTS ARE

The author (holding oars) and his navigator, Emory Bronte.

Why did Ernie Smith lose his race against the Army tri-motor? What happens to daring flyers after their deeds are done? Let Ernie Smith tell you the surprising answers.

WHY didn't I get a break?

I can't figure it out.

It's three years now since I crawled into an old single-motored crate that was bulging with gas tanks, and flew across 2,400 miles of very wet ocean to the Hawaiian Islands.

I figured I was sort of marking the spots where they'd put the traffic buttons for this transpacific service folks have been dreaming out loud about. These experts can talk all they want and build super-planes, but there never will be a service across the Pacific until a couple of dozen of us trail blazers have struggled over the route.

What did I get out of it?

A couple of gross of chicken dinners —I got so I would kick a chicken in the face on sight—a bawling out for flying the damned ocean too soon; another for asking for help; a wrecked airplane, and a yen to fly all the oceans in this man's world.

Anybody who thinks this ocean flying business is a cinch is all wet. And they're liable to get all wet if they try it—especially with present day equipment.

Take my flight, for example. Here's what I went through to dodge boat fare and deck quoits between Calfornia and Hawaii.

When word came from the front that the war was over and they didn't need any more flyers like I was turning out, I up and quit the army and went out to promote an airplane for the big hop.

I thought that would be the easiest part of the whole business.

I should have taken some empty basket along with me because I got beaucoup razzberries wherever I went. Some folks acted quite nice about it, but still they said no. Others just said no. A few were frank enough to offer to lend me a gun or to stand by and keep the crowd back while I jumped in front of a locomotive.

About that time the question of food and clothing became serious. I went to work flying the forest patrol. That gave me a lot of cross country flying experience that would come in handy. Two of us had the whole state to patrol.

I quit to take a job flying the coast mail out of San Francisco. Whenever I was off duty, I kept pegging away, looking for a backer.

I got all kinds of tips about big sportsmen who were just waiting for such a proposition. They all fizzled.

It was about March of 1927 before I got a real nibble. A real estate man named Moffett, an ex-army flyer, figured he could do me some good. I went to see him, laid my cards on the table.

One rainy afternoon Moffett telephoned me to hurry over to his office. When I got there he introduced me to Tony Parente, one of the west's best known sportsmen and as white a man as ever lived.

Two hours later all I needed for the Hawaii hop was an airplane. Parente agreed to back the venture.

I wired all the factories. Lindbergh had just flown the Atlantic and the plants were tied up with overnight orders. Also a chap named Dole had just posted an offer of $25,000 for a race in August from the Pacific coast to his home town. That had brought some more orders for ships. Dole was Hawaii's pineapple king.

I went out to the air mail field and made an offer for the ship I had been flying. Although the ship was needed in the service, the boss readily agreed to sell it to me. That was right nice of him. The ship was a cabin monoplane, single-motor job. Had been in the service for about six months.

I tried to get a new engine. I wired the factory. They couldn't fill the order for about six months. I wired the president of the company and told him I would hop off with one of the old-style engines and if it went phlooey, it would be too bad for both of us.

The army ship "Bird of Paradise" which defeated Smith in the race to be the first to fly to Hawaii.

A new engine was shipped to me the following day.

I had the ship torn down and moved to a garage. Tanks had to be made and installed. Hired a gang of mechanics led by Pop Wild, an old-timer in the flying business.

HAWAII is 2,400 miles from the mainland. To allow a safe margin for headwinds and other trouble, thirty hours of gas was needed. I had a 200-gallon tank installed in the cabin. There was just room enough for the navigator behind it. My cockpit was right in front of this tank, astraddle the engine. Both cockpits were open. Tanks in the wings provided space for the rest of the 350 gallons.

I did my best to keep the preparation secret, especially from the press. I didn't want to stir up any competition.

One morning I picked up the paper and saw the whole yarn in the headlines. Moffett had tipped off a newspaper man. The newspaper man had tipped off his paper and his paper had tipped off the rest of the world. An army of reporters and cameramen were waiting for me when I came in off the run that afternoon.

The late editions that day brought the bad news. A three-motored army plane was on the way to the coast to attempt a flight to Hawaii. It was scheduled to hop off during the first week of July.

We worked like dogs to get my ship ready ahead of that time.

I was so busy I nearly forgot to select a navigator. Moffett was scouting around to see if he could rake up any side contracts for us. During the scouting he ran across a Captain Carter and sent him to me.

Captain Carter said he had been following the sea for many years and knew all angles of navigating. I didn't, so I hired him.

Word was rumbled around that the army planned to hop at dawn. Their ship had been christened "Bird of Paradise." I had hoped they would wait another day. The newspaper gang checked around and discovered that the report was fairly straight.

I didn't mind a race because I figured my ship was at least 15 miles an hour faster than the flying War Department.

I called Carter and the mechs into one of the newspaper tents we had borrowed for a headquarters. I told them the dope. Pop Wild said that if we could scrape him up a couple of extra pairs of hands he might get the ship

THE BUNK!

"This is the only story ever written of my flight to the Islands of Hawaii"—

Ernie Smith

Above, the crowd milling around Ernie Smith's transpacific plane. Left, Smith's plane just after his second take-off for Hawaii.

ready before daylight. Carter had to adjust some instruments and didn't think he could make it but would try.

Pop went back to the ship and whipped his gang into taping gas lines, oil lines, and greasing rocker arms. The army gang started to fuel the "Bird of Paradise." The crowd got larger.

Pop and his gang worked all night, started pumping gas into the tanks about an hour before sunup. I crawled in then to get some sleep.

Dawn came and nobody hopped off for Hawaii. It was foggy and cold. At seven o'clock, a couple of hours after the sun had sneaked up over the hilltops, behind a curtain of fog, a taxi drew up alongside the army ship. Out stepped Maitland, the pilot, and Hegenberger, the navigator. Both fine scouts. Major General Patrick, the big chief of the air corps, dropped in by plane a few moments later. It had been rumored that he was to accompany Maitland and Hegenberger.

I was up and fidgeting around, anxious to get going. Moffett was fussing and fuming like he was going to run on ahead to show me the way. Pop Wild had things just about ready to go. There was a lot of last minute stuff. I wanted an altimeter that had closer calibrations than the one on the instrument board. Needed it if we got into soupy weather and had to come down through the stuff. Sent a ship over to Crissy Field to pick up one. That took time.

Then the army's engines were started. Maitland was in the cockpit. Hegenberger was talking things over with the general.

Handshakes all around, a blast of the engines and the army was off to Hawaii. They had a flock of gas on board. Makes a hell of a fire in a crash. She cleared the ground at about 3,000 feet

Friendly rivals—Hegenberger, Smith and Maitland.

and slipped away toward the Pacific, flying low.

For the next two hours my ship was like a bee-hive. Everybody was climbing over everybody else. Moffett came around with some contracts to sign. Carter, Parente and I were to share evenly in any profits that might result from the flight. Also there was a contract with an oil company and another with a newspaper. Things looked bright. We stood to clear about $25,000 each. Why hadn't I got around to this business before?

Then everything was all set. We still had a chance to beat the army. I climbed into the cockpit. Carter took his place behind the gas tank.

THE engine caught on the first try and I fed the throttle to her slowly. As soon as she got warmed up I turned off the switch. Pop climbed in and wired around the switch to prevent any short circuit there.

Once more the engine was started. Moffett was jumping up and down, raising a cloud of dust.

When we were finally set to go, the army was three hours out.

With the help of my crew and the best in the engine, the ship got to rolling. It picked up slowly, very slowly. I wasn't worried because we had a mile of runway, so I kept her on the ground. At 4,000 feet she got to bouncing, so I let her have the reins. She climbed slowly. It was just like flying a truck.

One circle over the bay and we headed over the Pacific in pursuit of the army. They were some 300 miles out, according to radio reports.

The Farallones, the last bit of land between us and Hawaii, were just beginning to fade away in the distance when Carter rapped on the back of my seat and handed me a note.

The note read:

The windshield has blown away. We'll have to go back.

I thought he was kidding because he knew when he signed on that we didn't expect to fly the Pacific in a sedan.

Then came another rap and another note.

This one read:

Turn back or I'll dump the gas.

Then I knew he meant business. That was one bad feature of the ship. The dump valve was located in the navigator's cockpit. One twist and the contents of the main tank would flow out into the air. That would leave us barely enough to get back to shore.

For a moment I tried to bluff Carter out of it, and kept the ship headed for Honolulu. He rapped on the seat and motioned toward land.

I swung the ship around and headed back as fast as it would go. Maybe the trouble could be repaired in a couple of minutes and we could start out again. We still had a chance to beat the army.

To prevent any further delay I decided to land with the full load of gas. Perhaps I should have dumped it. To land with that load of gas was just like jumping off a table with a one-ton block of concrete on your shoulders. It was quite a chance, but the landing gear was plenty strong.

The old crate sank like a rock when I cut the engine. That meant I would have to fly her right down onto the runway. That's just what took place. Kind of ticklish, but it worked out okeh. That flying gas truck hit the runway, rolled a couple of hundred yards and came to a stop. The crowd swarmed around like bees.

Carter climbed out as soon as the ship stopped. I yelled to him, but he slipped away in the crowd. Guess he didn't hear me. I told Pop the trouble and told him to get it fixed as fast as he could, so we could hop off again.

While the ship was being towed back to the head of the runway, I looked up Carter.

He spoke first.

"I'm all through, Ernie," he said. "It's too late to catch the army and there's no use in us flying out there again."

I couldn't speak. It was too much of a blow to me.

Carter walked away. That is the last I ever saw of him. I learned later that a ouija board had told him of a fortune hidden in the South Seas and

that he hoped to make enough money out of the flight to hire a boat for the fortune hunt!

I CALLED the newspaper gang and told them the flight was postponed indefinitely. It was too late then to catch up with the army.

The next morning I read of the army's landing at Honolulu.

I spent the next couple of weeks in trying out navigators. One of the first I ran across was a fake. I told him to set a course for the Farallones. Before we got half way there he had me going around in circles. I waved for him to lay off and then I headed the ship down over the ocean. From the Farallones back I chased the fishing smacks, diving down at them and pulling up when I saw the whites of the fishermen's eyes.

When I landed back at the airport, this would-be navigator crawled out of the cockpit and reeled away. That was the last I ever saw of him. He picked the wrong spot for bluffing. Navigating a plane over 2,400 miles of ocean to a couple of small islands is no job for a bluffer.

I had just selected Bronte, an ex-navy man, as navigator when Maitland and Hegenberger returned by boat. Everything was set again. My ship was christened City of Oakland.

Maitland and Hegenberger were on hand the morning we planned to take off. So was a crowd of 50,000 others. The date was July 14, 1927.

It was pretty foggy. I sent Sandy Sanders, a side kick of mine, up in another ship to see what the ceiling was. He reported 800 feet. That meant we would have to climb above it before we hit the Golden Gate, 10 miles away.

This time there were no side contracts, just the ones binding Parente, Bronte and myself to split the profits, if any. We could have had plenty of side contracts, but I figured if we didn't reach Hawaii, they wouldn't do us any good, and if we did reach there we would have plenty of time to draw them up. That was wrong, all wrong. Next time I'm going to have everything on the dotted line before I hop off. We like to fly for glory and all that, but us pioneers can't seem to get out of the habit of eating.

Maitland and Hegenberger wished us luck. There was a sort of wave of miscellaneous handshaking and kissing. A flock of sandwiches were shoved on board, a rubber boat, a radio, a case of pigeons to be released when we got several hundred miles out. Strangers crowded around to offer us good luck charms.

The first attempt to take off ended in a ground loop when the ship sank in a rut. It looked like curtains for the flight, the way that right wing slanted down. We lucked out though. The tail was lifted onto a truck and the ship towed back to the head of the runway. Bronte and I rode back in an auto.

The ignoble end of Ernie Smith's flight across the Pacific. A forced landing on Molokai, Hawaii Islands.

The next attempt was successful. We got off at about 3,500 feet. Escort and camera planes were already in the air. I swung around in a wide circle, kept the ship in an easy climb.

We had a couple of thousand feet when we passed over downtown San Francisco.

I headed out over the Pacific. The escort ships turned back a few minutes before we passed over the Farallones.

The army's radio beacon was on and Bronte tuned in on that. The War Department was right decent to turn it on especially for us.

The fog got thicker. I settled myself at the controls and prepared for a long stretch of plain and fancy flying.

IT'S funny what a fellow thinks when he settles down for a flight across an ocean. I never thought about the possibility of being forced down on the way or of turning back. All I thought about was just keeping on flying until we reached the islands.

The crate was gradually getting lighter as the gas was consumed. She was getting easier to handle, not so much of a strain.

During all the time I had planned this flight, the night part was the only thing that had me worried. There was nothing to do except to keep on and watch the instruments so she didn't stall and slip into a spin. Sometimes it was pretty hard to believe that those little dial needles are telling the truth. Bronte signaled compass directions to me by flashlight. When he flashed it on one side, I headed her that way until he blinked the light again.

About midnight I began to get tired. Up to that time, since before noon, I had been flying in my shirt sleeves. I put on a sweater. It was getting a little chilly. I was getting awfully sleepy. Every once in a while I caught myself nodding. Watching the lubber line on the compass made me sleepier. I tried watching stars. A couple of minutes of that and I found the ship in a dive and Bronte's light blinking at me. I straightened the ship out and went back to watching the lubber line.

I had hopes of seeing some kind of a vessel, so I could pooh-pooh at the captain. Some fellow had given us a whole list of vessels that were out on the Pacific then. I figured that a large part of our time would be spent in saluting and pooh-poohing these vessels. I was wrong.

Towards daylight, the engine began to miss.

That was something. When that engine sputtered I felt like I was hit in the head with a sledge hammer. I made a quick check. Must be a gas leak. When I went to work on the hand pump the engine picked up again. The way I worked that pump was nobody's business. If it had been hooked up to the prop we wouldn't have needed the engine. It looked like we were doomed to find out what kind of water the Pacific was made out of. And 700 miles or so to swim. Of course land was a lot nearer than that, but not the kind we wanted. The chart showed quite a strip about five miles—straight down.

LET me quote a few passages from our log:

6:00 *a.m.*—All gear ready to go into rubber boat when time comes. I doubt if the thing will float. Sending frequent calls QST, advising our position and requesting ships and planes to look for us. Altitude, 6,000 feet. Thick cumulus clouds.

7:00 *a.m.*—Landing soon, now, I

(*Continued on page* 58)

Boy Wins $5000 Airplane on Wager

HOW a horse was instrumental in securing a $5,000 airplane for an 18-year-old boy was revealed when Charles G. Hill, chairman of the board of the Amazon Cotton Mills, Winston-Salem, N. C., wrote out a check for that amount.

It seems that Charles G. Hill, Jr., a student at Culver Military Academy, had an agreement with his father that if he became an officer in the Black Horse troop inside of a year, he would also become the owner of a plane that he could choose himself.

The difficult feat was achieved and the boy immediately wired his father when he was made a corporal through his ability of horsemanship on one of the famous mounts at the academy. Although the boy has been a pilot for two years he has never before owned a plane. At first the son picked out a ship that had a top speed of 180 miles an hour. After a number of telegrams had been exchanged a compromise was effected, however, and a slower ship was selected.

Strange Ornithopter

MANY strange air craft are designed on blueprints but only a few are actually built.

Some time ago George R. White conceived the idea of a wing-beating foot-propeller ormithopter and then went ahead and built it.

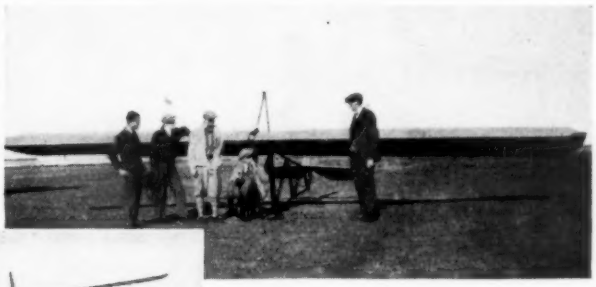
The first test of White's machine was made at St. Augustine Beach, Fla., when the glider was in the air for two hundred feet. The plane was towed by an automobile and then took off from the ground and stayed in the air for the distance.

British Building 6-Motored Plane

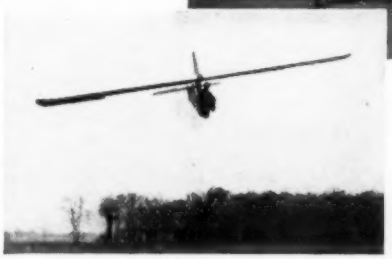
NEXT year should see two British six-engined flying boats, each of approximately 5,000 horsepower, in the air. Huge craft of this kind, able to fly more than 1,000 miles without alighting to re-fuel, can carry forty or fifty passengers in comfort.

Maximum speeds of 150 to 160 miles an hour will allow these new ships to operate over long water routes. The planes will have a loaded weight of 33 to 40 tons and a wing-spread of some 140 feet.

W. A. Butcher Wins Popular Aviation Prize



Right, W. A. Butcher's Rhon Ranger glider which he built from Popular Aviation plans. Below, K. C. Baltzell (2nd prize - winner) on a 1 min. 35 sec. flight in his Rhon Ranger.



POPULAR AVIATION takes much pride in awarding first prize in the Glider Building Contest to W. A. Butcher.

Mr. Butcher is Sec.-Treas. of a glider club at Edmonton, Alberta, Canada. This prize, a $50 gold watch, was given to the first one who submitted an authenticated picture of a Rhon Ranger glider built from the plans published in recent issues of POPULAR AVIATION.

Mr. Butcher and his friends worked on their glider for 5 weeks, finishing it on October 5th. Their first flight was quite an event in Edmonton, it being the first flying glider in town.

Airport officials and other interested spectators gathered at the air field to witness the trial. Pilot Rutledge fastened himself to the seat and took the controls.

The glider was attached to the end of a long rope and towed northeast across the field by an automobile. As the car gathered speed the pilot slowly pulled the stick back, and the glider left the ground like a bird and soared upwards. When it had reached the maximum height allowed by the towing rope, the cable fell away and the glider flew across the field for several hundred feet and descended to earth, making a splendid landing.

Exultant cheers greeted the first successful trials, and, within a short space of time many of the local and outside pilots had experienced the thrill of gliding. Capt. Maurice Burbridge, pilot instructor of the Edmonton Aero Club, was one of the first to try the glider, and he expressed himself as being highly delighted with the results. "This is real gliding," he said enthusiastically as he returned to Mother Earth.

Mr. Butcher advises us that the glider flew perfectly from the start. No alterations were necessary. All materials for building the glider were obtained locally, with the exception of hard wire.

"I might say," writes the prize-winner, "that the Rhon Ranger has given great satisfaction and already two more are being built in town from the same plans. It takes off in still air at about 25 M.P.H. which is considered good, as Edmonton is at an altitude of about 2,400 feet.

"I did the biggest part of the building myself and although I have had no previous experience on building aircraft, I had no difficulty at all."

A close second in the Glider Building Contest was K. C. Baltzell of Fort Wayne, Ind. His Rhon Ranger built from POPULAR AVIATION plans weighs 140 lbs. and is giving him very fine performance.

Pilot Forced Down on Water; Rescued by Submarine

ALL sorts of strange incidents occur in the adventurous career of airmen, but for an air traveler to be rescued by an underwater navigator is a unique bit of news.

Lieutenant James H. Bevans, Army Air Corps, played a major role in this unusual event when, taking off from France Field, Panama, recently with another army officer as passenger, he found his Douglas O-2 pull up with a dead engine over Panama Bay off Coco Solo.

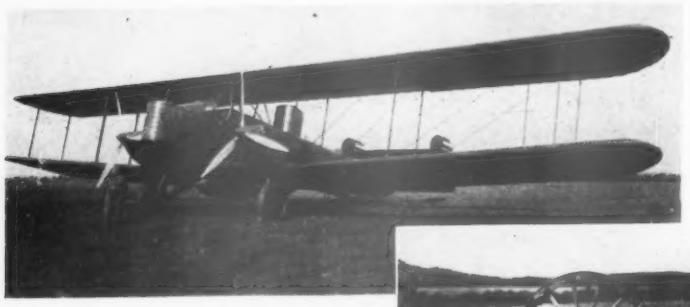
The dead engine resisted all efforts to start it. Nothing but water apparently lay below. Realizing that land could not be reached Lieutenant Bevans began tacking the plane down, shouting to his passenger that they would have to take a chance on the water.

Suddenly a U. S. submarine nosed upward through the foam and the aviator, thanking his particular lucky stars for the "tin fish's" timely appearance, set his plane down as close to the undersea craft as he could, flashing the distress signal meanwhile.

A rope was thrown from the submarine and Lieutenant Bevans and his passenger clambered aboard the sub, suffering nothing more than a drenching. The plane sunk to the bottom after only a few moments atop the lashing waves of the bay.

XUM

Condemned Planes Serve as Army Targets



Left, a Curtiss Condor bombing plane carrying a 4,000-lb. demolition bomb.

Above, what was left of an army wagon after the bombing planes were through practising.

SCENES reminiscent of the late war were reenacted recently at Camp Stanley, near San Antonio, Texas. A squadron of 18 planes from the Third Attack Group, Fort Crockett, Galveston, Texas, were given real targets at which to shoot in the form of 20 condemned airplanes which were no longer fit for service. These wornout planes were arranged on the ground to simulate a squadron airdome in war-time.

The attackers launched successive assaults against them, employing small fragmentation bombs and 100-pound demolition bombs, in order to determine the relative efficiency of these two missiles in the destruction of aircraft on the ground. Following the assaults with the bombs, the attackers once more swooped over the old planes and rained down upon them tracer ammunition in order to test the incendiary effect thereof against airplane structures and gasoline tanks.

This was the first time any test of this nature has been undertaken by the Air Corps, and very important data was collected on the effect to be expected in similar attacks upon hostile airdromes in time of war and the resulting destruction to enemy aircraft on such airdromes.

The squadron from the Third Attack Group employed their usual tactics of barely skimming over the ground and brushing over tree tops in staging surprise attacks.

Some Facts About Aviation in China

AIRPLANE sales in China are at present limited to the government for training of pilots and military use. There is no private flying there inasmuch as the airplane is considered by the government as contraband, and special permit must be secured for its importation and use.

There are at present two flying schools in the republic under government control, one at Canton and at Nanking, which are controlled by the Nanking government, and one at Moudken controlled by the Manchurian government. The school at Canton is the larger and graduates about 30 pilots every six months, these students being selected from the most promising of the better (or merchant) class boys who have graduated from what is equivalent to our high school.

With sufficient training and good equipment, the Cantonese are said to make excellent pilots. There are about ten Chinese pilots, most of whom are Cantonese, who received their flying training in the United States, now in responsible executive government positions.

A Modern Helmet for Aerial Communication

TELEPHONE connections between ground station and pilot are now common practice.

Several types of instruments are already on the market. This one is a Western Electric apparatus.

The pilot in an open cockpit can carry on a two-way conversation despite the rush of air and the roar of the motor. The ear phones are built into the flying helmet and the transmitter stays in position.

Lost Instrument Found by Fisherman

AN aeronautical octant that laid for two years in the bottom of the sea, at a point 80 miles off Block Island, was returned yesterday to its original owner, Lieutenant C. H. Schildhauer, formerly a member of the U. S. Navy Air Corps and now sales manager of the Dornier Company.

And the instrument was returned because a deep-sea fisherman threw his nets overboard at a point half-way between Montauk Point and Block Island with the knowledge that fine beds of scallops might be found in that area. At the conclusion of a profitable haul, he lifted from the mass of sea food a strange instrument that looked very much like a mariner's sextant.

The fisherman, Arthur C. Wood, 94 Saxton Avenue, Sayville, L. I., took the instrument home with him, cleaned the corroded metal and read from a small plate:

Brandis & Son, Inc.
Brooklyn, N. Y.
6255
Aeronautical Octant
Mark 1 Model 2

Forthwith, he wrote to Brandis & Sons, now a subsidiary of the Pioneer Instrument Company of Brooklyn, stating that he had found the octant while deep-sea fishing and adding: "With the thought that some interest might attach itself to the above described instrument, when it is properly identified and traced, I refer the data to you and I will greatly appreciate information relative to ship from which lost."

When Charles H. Colvin, president of the Pioneer Instrument Company, received the letter, a coincidence would have it that Lieutenant Schildhauer would be a visitor in his office—the first time the men had met in more than two years.

The Lieutenant volunteered that the octant might well be one that he lost in 1928 when he set out one day in June flying a PN-12 boat from Newport, R. I., to Hampton Roads for the purpose of gathering data on celestial and radio navigation.

Before the flight had proceeded far, the plane was forced down by motor trouble, 90 miles off Block Island and about the same distance from Montauk Point. Information of the landing was radioed to Newport and the destroyer U. S. S. Flusser was sent to rescue.

The crew on the plane directed the Flusser by means of a radio compass and the rescue was effected at six o'clock in the evening. The plane was taken in tow, but in the darkness, the line parted. The destroyer proceeded back to its base to await daylight. Before the search was renewed, a freighter sighted the derelict and reported its position.

Another naval boat, the U. S. S. Lawrence, set out from Newport, found the plane, but turned it over in attempting to effect a tow. The Lawrence

(*Continued on page* 64)

How to Power Your Rocket Model

Why buy ready-made rockets? Compound your own powder and build them yourself. Mr. Rathbun offers explicit instructions in this article.

by

JOHN B. RATHBUN

A CONSIDERABLE amount of attention is now being given to the design and construction of model rocket planes, and this interest in turn demands a closer study of the powder used as a fuel for the rockets.

It should be particularly noted that the object of the powder composition is not to cause a violent explosion but to produce an intense combustion with a moderately high pressure that will endure over a considerable length of time. It is imperative that we get away from the explosion idea altogether and view the powder in the same light as the gasoline used for the larger airplane engines. The powder is to be used as a fuel and nothing more.

When a gasoline engine draws in a charge of gasoline it also draws in a sufficient amount of air to burn it, and oxygen must be provided for combustion in some way for the combustion of of any fuel. In the case of the rocket, the powder charge is tamped tightly into an air-tight tube. It is impossible for sufficient atmospheric oxygen to gain access to the powder by any practical means and therefore the oxygen in a rocket is provided by some chemical compound. A great amount of oxygen in compact form must be combined in such a way that it is readily liberated by heat.

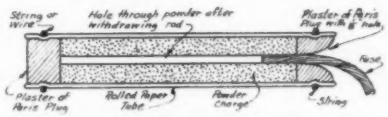
Assuming that charcoal is used as the principal fuel in a rocket powder, which is generally the case, then a sufficient amount of some oxidizing compound such as salt-peter is added for burning the charcoal, and under such conditions we can have complete combustion entirely out of contact with the air.

Now, ordinary gunpowder is designed with a view of producing a very sudden combustion so as to cause an extremely high pressure, and this is exactly what we wish to avoid in rocket propulsion. Gunpowder would not only burst the rocket cartridge, but its duration would be so brief that it would not have much effect on the propulsion of the model.

What we really desire is a very slow burning powder, burning for a considerable length of time at only a moderate pressure—a pressure that can easily be resisted by a cardboard tube such as used for the well known Fourth-of-July rockets, pin wheels, Roman candles and similar fireworks. Here we still have charcoal as the basic fuel substance, and also some oxidizing substance, but the proportions and composition must be such that the oxidization takes place at a low rate.

ONE way of attaining slow combustion without danger of explosion, is to use an oxidizing compound that liberates its oxygen very slowly. Among such salts are the orange colored salts known as the "chromates." These salts, however, require much technical preparation and will be passed by.

Another, and more practical method for the amateur powder maker is to dilute the powder with some relatively inactive powdered substance such as meal powder. When thoroughly mixed with the inflammable powder, the meal powder delays combustion and also reduces the pressure by absorbing the heat produced.



A diagram showing a rocket tube properly filled and fused.

In some cases, powdered coal has been used in place of the charcoal for securing delayed combustion, but as this requires a more careful adjustment of a rather complicated oxidizing agent, its use is not recommended at present.

One formula for a rocket powder that has met with a considerable amount of success is the standard rocket powder employed by the manufacturers of fireworks. This is mixed in the following proportions, all by weight:

1 Ounce flowers of sulphur (powdered).

2 Ounces willow charcoal (powdered).

4 Ounces saltpeter (powdered).

1 Ounce meal powder.

This gives us a total of eight ounces, or half a pound, but the same proportions can be used in mixing up any amount. All of these materials can be obtained at any drug store at a very moderate price.

Molded blocks of powder can be used to advantage as rocket fuel.

One of the most important factors in the manufacture of this powder is to have the ingredients thoroughly mixed together and in a very finely pulverized condition. If lumps of the various elements exist in the powder, or if the various elements are not perfectly distributed through the mass, then the powder will be very inefficient and possibly will not work at all.

It is a good plan to first grind up the meal and charcoal together to a very fine powder. Then add the saltpeter and grind this in with the other two ingredients, using very light pressure and grinding very slowly to avoid heating or sparks. A wooden bowl and a wood rod are the safest. After this is done, the sulphur can be thoroughly ground with the other ingredients. The more grinding, the better the powder.

We hardly need to state that this mixing should be conducted with great care, and only in small batches at one time. Probably one-third of the above batch should be ground at one time, so that in case the mixture should be fired, there will not be a sufficient amount present to cause a serious flash.

By all means keep the mixture away from flames or lights of any kind, and when the powder is completed, it should be stored in a dry place away from artificial heat, packed preferably in tin cans to keep out the moisture and to protect it from flame.

THE powder can be put into the tube about a teaspoonful at a time, and is tamped down lightly with a wooden rod. Still better results are obtained if a wood rod is first placed in the rocket tube, tamping the powder around the rod. On withdrawing the wood rod, a hole is left through the center of the powder, which gives a larger burning area and more power.

One end of the tube is completely plugged with plaster of paris, while the other end is only partly plugged, leaving a hole about ⅛ inch in diameter for inserting the fuse and at the same time acting as a nozzle for the jet of flame. If this opening is made too small, there will be an accumulation and danger of bursting the shell. If the hole is too large, then the escape of the gas will be so rapid that little pressure is created. Experiment will determine the best size of this opening.

I have been experimenting with various combinations more suitable for use than a simple powder, and have come to the conclusion that small molded blocks of powder are more suitable than the loose powder itself. For example, the powder just described is mixed with some light gum solution such as a thin solution of gum arabic, gum tragacanth or damar gum, and then this sticky mass is moulded in waxed paper molds to give them a cylindrical form. These little blocks of powder make it easy to reload the rocket after a flight, and are much more convenient to handle than the powder.

In the case of the powder cylinders, the combustion is slower than with the loose powder, and the gum used for

binding the grains together still further slows up the combustion so that we generally dispense with the meal powder altogether. It is necessary, however, to leave a hole through the center of these small powder lumps so that combustion will spread along the length of the rocket tube.

Future Plans for Rocket Planes

THE rocket, as you know, is propelled by the thrust produced by expelled gases created either by igniting powder or causing the combustion of two liquids. It works on the principle of a shotgun which shoots gases rather than shot. Basically it is much like an ordinary Fourth of July skyrocket. Propulsion is produced not by a push against the air but by recoil due to the gases.

While experiments with powder rockets have been successful, indications are that the liquid propellants are much more efficient and are capable of greater development.

At the present time scientists are rather well acquainted with the air and its contents up to twenty miles above the surface of the earth. Beyond that altitude, all present data are more or less theoretical. Perfection of Professor Goddard's rocket will mean that thermometers, barometers, electrical measuring apparatus, air traps to collect samples of air and other instruments may be sent to extreme altitudes to bring back much needed information. It is planned to shoot the rocket straight up and to control its descent by means of a parachute. Its greatest weight will be in the liquid propellants which naturally will be exhausted in flight so that, in descending, the full-sized rocket will weigh very little, considerably less than an aviator jumping with a parachute from an airplane.

The advantages of vertical ascent are obvious. Present methods of reaching high altitudes are limited to balloons whose ascent cannot be controlled and whose place of landing on descent is a matter of uncertainty. Recovery of such balloons depends upon the person who finds them. Quite often they are lost altogether or their instruments tampered with to such an extent that the results are useless.

When one of the rockets is perfected, and this is admittedly a matter of years, much valuable information will be obtained in the fields of meteorology, astronomy, radio broadcasting, aviation and science in general. For instance, it is expected that a great deal will be learned of the spectrum of the sum above the ozone layer from 50 miles to 75 miles above the earth's surface. Further knowledge will be gained of radio broadcasting waves which are known to follow the ceiling known as the Kennelly-Heaviside layer. This is assumed to be a layer of air charged electrically. In the field of meteorology and as a particular aid to aviation, it may be possible to prepare high elevation weather maps.

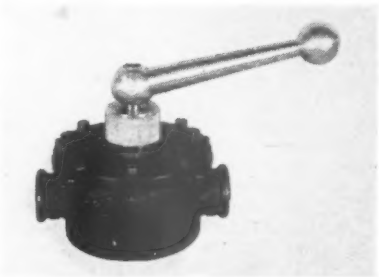
WHAT IS A WOBBLE PUMP?
A Brief Description of a Hand Fuel Pump

SEVERAL months ago POPULAR AVIATION published some interesting details on the Curtiss XBT-4, a new military plane. The description made mention of a "wobble pump."

Many readers did not seem to know what a "wobble pump" was. A few words on this important airplane part will serve to explain what a wobble pump looks like and what it does.

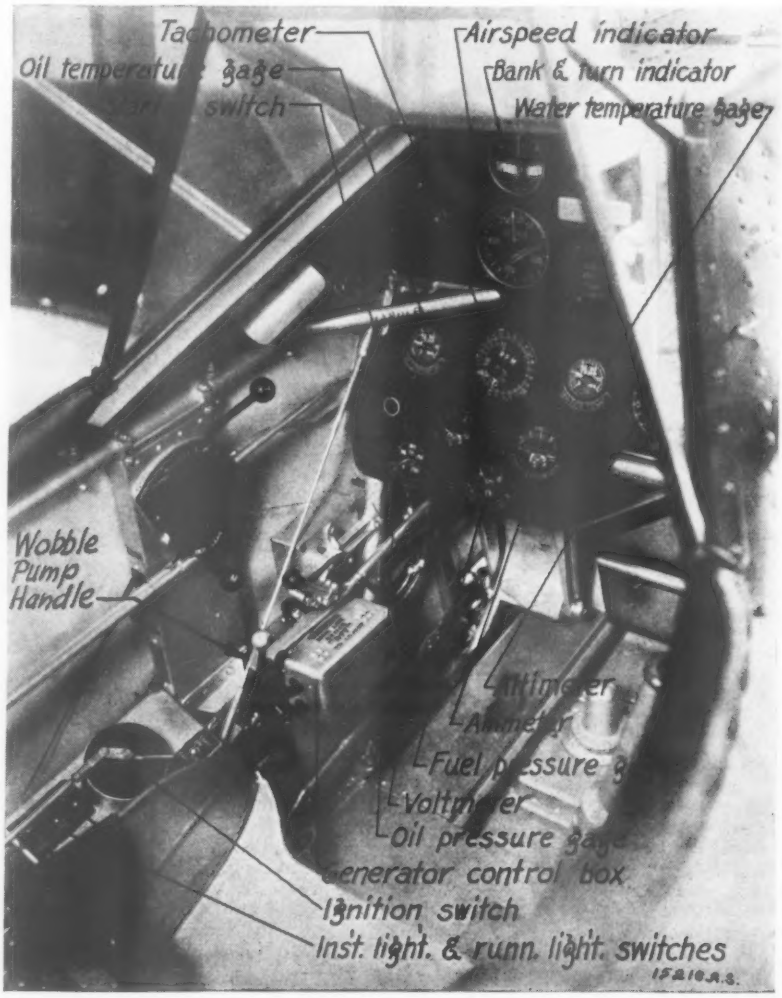
Air pressure in fuel tanks is no longer used as a means of boosting the fuel to the carburetor. Mechanical pumps have been used for this purpose, the pump being run by the engine.

In the event of failure of this pump, the "wobble pump" serves as a manually operated substitute. Owing to the restricted space in most pilot's cockpits, it has been found impracticable to use the pump with a rotary handle. The pump that is used, however, is operated by wobbling the handle back and forth (hence its name) through an angle of about 60 degrees, this slight motion being adequate in keeping the carburetor supplied with gasoline from the tank.



A "wobble pump" manufactured by the National Steel Products Co. Its official name is "hand fuel pump for starting and emergency."

A diagrammatic photograph of the left side of the pilot's cockpit in an Army observation plane. This particular plane is a Douglas O-25B.



Tales of the Caterpillar Club

FIRST LIEUT. JOHN R. GLASCOCK, Air Corps, tells the following interesting story as to how he qualified for membership in the Caterpillar Club:

"I obtained clearance from Post Operations Office (March Field) for airplane YPT-6, AC No. 30-378, June 5, 1930, and took off about 1:40 p. m., and flew around for about ten minutes with Sgt. Murdock as passenger. I then landed and took off again at 1:50 p. m. with Private Stephen Yazza as passenger, who was authorized to make the flight to get in his flying time for the month. I gained an altitude of about 2500 feet. I tried two rolls and wing-overs, then nosed the plane down slightly for a slow roll. I used top rudder and forward stick, and it is my belief that the elevator welds broke, because the plane, instead of staying on its back turned into a violent outside spin.

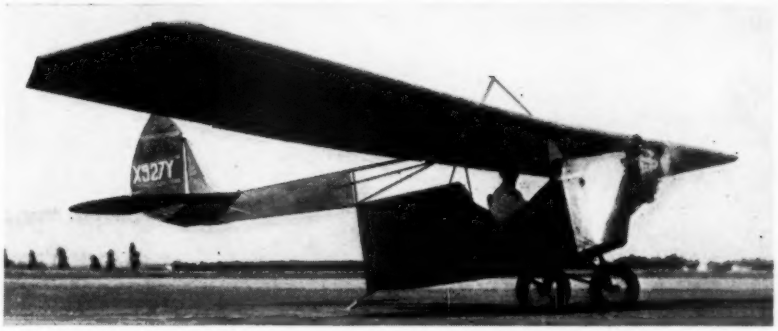
"No pressure on the controls, either rudder or elevator, was noticeable. I tried opposite rudder, back stick, forward elevator, with no diminution of speed or cessation of continuous movement of plane. I tried with power off and power on. I knew at approximately 1800 feet it would be impossible to get this plane out of the particular maneuver it was in at that time. The outside spin was very rapid and the nose was only about three degrees below horizontal position, directly on its back. I looked in the mirror but could not see the passenger in the back seat at any time, and shouted for him to 'bail out.'

"The rest of the time between 1800 feet and 500 feet above the ground I was busy with the controls trying to get response from the airplane. Approximately between four and five hundred feet from the ground I unbuckled my safety belt and was thrown from the plane in a horizontal position, slightly up, for nearly a hundred yards. I pulled the rip cord and the chute opened almost instantaneously with a very loud snap and intense jerk. I was then in a position facing the water tower of the field, and my body was parallel with the middle of the water tank. I landed hard, fell backwards, unbuckled the parachute straps and immediately proceeded to the plane, which had crashed within two hundred feet of where I landed, and observed that Private Yazza was still in the plane but was unconscious."

THROUGH Major Stanley W. Jacques, Air Corps Reserve, the particulars were secured regarding the forced parachute jump made by Mr. Robert G. Chew at Valley Stream, L. I., New York. Mr. Chew's story is as follows:

"At 7:15 o'clock, Sunday evening, May 18th, I was test-flying the 'Mercury Chick' at Valley Stream. I took off and climbed to approximately 1500

(*Continued on page* 53)



Odd Lightplane Called Flying Bath Tub

THEY call this odd-looking machine "the flying bath tub."

This combination glider and airplane was designed for aid in flying instruction. Its 40 H. P. motor and fuselage are detachable. The student learns to glide, then he puts on the motor and learns to fly.

Romer G. Weyant, the pilot sitting in the cockpit, recently made 80 miles an hour with the "tub." Its shape gave rise to the name. Weight, 506 pounds.

New Meteor P-2 Receives Certificate of Approval

WE CAN offer our readers some advance information on the new Meteor P-2 training and sport ship, but a good photograph is not yet available.

This 32-foot, two-place, dual-controlled ship is manufactured on the West Coast by the General Western Aero Corp. It will cruise at 105 m.p.h. and has a top speed of 130 m.p.h. It weighs 1020 lbs. and carries a useful load of 630 lbs. The Kinner K-5 90 h.p. motor gives it a climb of 1200 ft. per min. Open cockpit, 24 feet length, 30-gal. fuel capacity, 40 m.p.h. landing speed.

The Meteor has set what aeronautical officials believe to be a world's record for design and construction of a new plane. Three months and twenty-two days after the first rough sketch was made on paper the Meteor Model P-2 was given its "NC" license.

The retail price, at the factory, is $2,950 with Kinner K-5 equipment.

Yankee Model Builders Break World Records

TWO world's records, one of which had stood for two years, were smashed by model airplane builders of White Plains, N. Y., in the Avio Club contest recently.

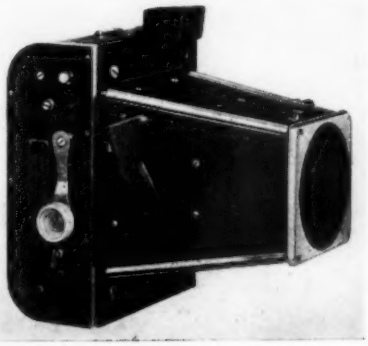
The very first flight made, by a model glider built and flown by Carl Goldberg, equalled the world record (1928) with a time of 14.6 seconds. Tom Allen then released his plane. It flew for 12.6 seconds the first time but on the second round it went so perfectly to beat Goldberg's record by over two seconds. The new record is 17 seconds.

In the Baby Rise-Off-Ground class, Goldberg showed his thorough knowledge and greater experience and ability over the other by twice breaking the record. The first time his plane stayed up 4 minutes and 23 seconds, beating the old world's record (4 min., 1 2-5 sec., 1930) by over 20 seconds. The next time his plane soared until he had set a new record of 5 minutes and 12 seconds.

Some Details of The K-10 Aero Camera

HERE'S something really new in aerial photography. A moderately priced aero camera for verticals and obliques—but with which you can also take close-ups on the ground.

The K-10 Aero Camera can be used in the air or on the ground.



The K-10 Aero Camera has an aluminum body and is finished in black crackle enamel and nickel. It is streamlined to break wind resistance.

The shutter operates from 1-50th to 1-220th of a second. It weighs 22 lbs. when loaded with its film capacity of twenty-five 5x7 exposure film roll.

The camera is equipped with specially designed grips, scientifically placed to steady camera and give proper balance. The grips are easily detached when camera is placed in suspension mount for vertical shots or mapping.

Length, 12¼ in.; width, 10 in.; height, 13⅝ in.; price $495.

The Fate of a Pioneer

J. H. Chesborough MacKensie-Kennedy

The colorful career of MacKensie-Kennedy embraces world famous achievements and disheartening disappointments.

by DOC SCHNURMACHER

"WE WANT you to tell us how commercial aviation in America can be put on a paying basis," said a leading Wall St. house, which has millions invested in aviation. And J. H. Chesborough MacKensie-Kennedy, a big, determined faced Scotsman who was flying in Russia as long ago as 1907 told them.

Mr. MacKensie-Kennedy is the daddy of the big airplane, the fifth man to fly and one of the foremost experts of the British Air Ministry during the World War.

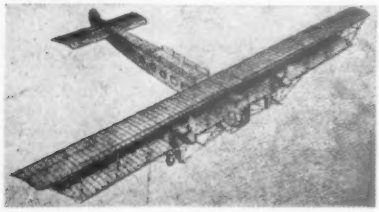
Seated in his little hotel room 'mid the plans and blueprints of the planes that he designed for the Allies, he tersely told this representative of POPULAR AVIATION, what he had told the banking interests.

"In my opinion, aircraft has advanced scarcely at all aerodynamically since the war," said the big Scotsman. "Perhaps experts might split straws over this matter but that is all it will amount to . . . just straws.

"Details of construction, materials and engines have improved—particularly engines. Yet radical structural changes have not been made. This is due to the fact that machines have become so standardized that a manufacturer is loath to change his production in major items. For airplanes to reach such commercial success as will enable them to pay their way in passenger flights, it is necessary to do away with the body of the plane altogether. At the same time, the wings must not be swept back.

"Large, slowly revolving air screws must be used. These props must be of the variable pitch type controlled by the pilot. Engines must be of the heavy oil . . . semi-diesel type. In this nutshell you will find the formula for real success in commercial aviation."

Mr. MacKensie-Kennedy then quickly demonstrated his formula by means of a simple graph (figure A). He showed the tremendous difference between the net lift and payload possibilities of the plane pulled by a small, rapidly revolving prop and one pulled by a large, slow turning prop. The latter, with but a slight decrease in the potential speed of the plane has infinitely more useful lifting capacity.



A sketch of the gigantic K3, a biplane designed by MacKensie-Kennedy.

"The war, which did so much to develop the plane, also oversold the aviation game on fast speed," said MacKensie-Kennedy, "and consequently lifting capacity has suffered."

And now, who is this audacious Scotsman who thus calmly goes on record with his radical assertions and theories. And by what right has he to be quoted as an authority? To begin with, the gods of Fate have not been overly kind to him since the war. But his history goes far before the time that he built the first big bomber for England. It goes back, in fact to the dawn of aviation itself.

IN 1907 J. H. Chesborough MacKensie-Kennedy was a youngster in St. Petersburg, Russia. Intensely interested in flying, he was at that time a balloonist and a member of the Imperial All Russia Aero Club.

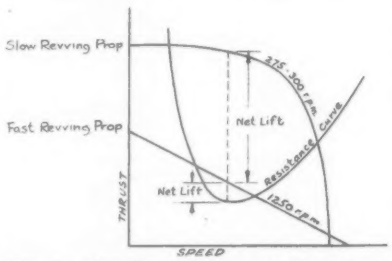


Fig. A. How the lifting power of a plane varies with the propellor speed.

His knowledge of airships was such that he was commissioned to build three dirigibles for the Imperial Russian Government. With him was associated Lieut.-Col. Rustam Bek who is now general in charge of the Bolshevik army in China. It was Rustam Bek who later immortalized the Scotsman in a book called Aerial Russia or the Romance of the Giant Aeroplanes.

His dirigibles completed, MacKensie-Kennedy, in 1909 began to apply himself to the big airplane idea, an application which in 1914 resulted in his bringing out basic ideas for large planes for the Russian Government. A year later he solved the problem of movement in load. He built the first plane then, that broke away from the idea of inherent stability and depended upon controllability.

A proportion of three men in five were enabled to move the full length of the body of the plane without affecting its equilibrium. This necessitated new relations between the tail portion and the main section of the plane which took up the movement of the load and therefore the movement of the center of gravity.

He built two other planes in 1915, each of them an improvement upon the first. His third plane was the world's biggest up to the time of the Dornier DO-X. It had a wing span of 132 feet. It was 26 feet high and eighty feet long, had 12 cabins and a capacity for 52 passengers.

Powering this plane was a problem. Airplane engines at that time were inadequate. MacKensie-Kennedy finally solved the problem by installing four 200 h.p. Salmson motors of French manufacture. These motors were recognized to have only one-third of the necessary horsepower and yet the plane established a world's record by flying fully loaded—a total weight of eleven tons.

It was at this time that "the breaks" intervened. MacKensie-Kennedy hurried back to England to aid his country in the building of planes. The knowledge and data which he had so painstakingly acquired in Russia were put at the disposal of the British Air Ministry. The Scotsman, himself personally volunteered to construct the first large bomber.

He did so at his own expense . . . at a construction cost of $420,000. Years later when the war ended, the British Government finally decided to make some recompense as a special honor. Accordingly on the 5th of February, 1920, he was given an award of $155,000 by His Majesty's Treasurer who wrote him that it was "Payment as sanctioned by H. M. Treasury for inventing an aeroplane."

"This honor left me $265,000 short," said MacKensie-Kennedy whimsically, "it was the usual cost of such honors."

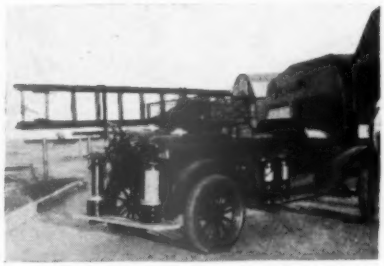
WITH his fortune thus cut so drastically, the Scotsman rolled up his sleeves and became the only man ever to own singly a London-Paris airline. He called it the "Airpost of Banks" and besides being the official carrier of the air ministry, it served the great banks of London and Paris. Banking

(*Continued on page* 58)

Fire Truck for Airport

AN EFFICIENT little fire-fighting machine, pictured here, was made by members of the city fire department for the Municipal Airport, Long Beach, Cal. William J. Putman, airport superintendent, is head of the volunteer department which will operate the apparatus.

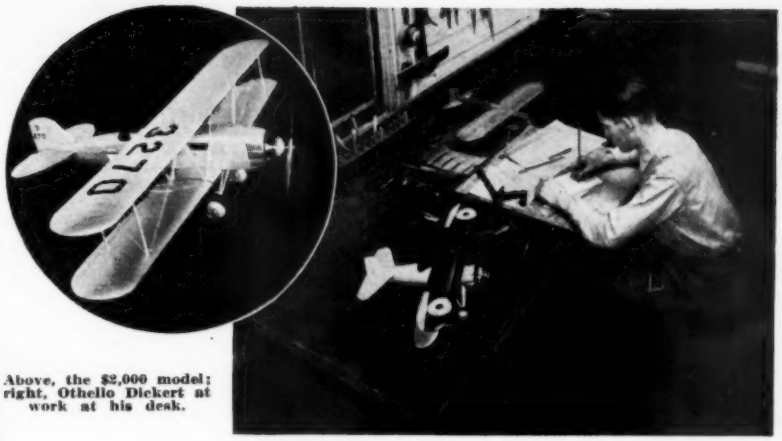
The equipment consists of two Foamite tanks and two soda-and-acid tanks, each of 2½-gallon capacity; one 35-gallon Foamite tank; one 35-gallon



soda-and-acid tank; 50 feet of hose, ladders, crash tools, first-aid kit and stretcher.

Once each week William S. Minter, chief of the Long Beach fire department, goes to the airport to give the flier-firemen instructions in the use of the equipment and to conduct fire drills.

"The boys are becoming adept at using the equipment," declares Chief Minter. "Considerable loss to property undoubtedly will be saved by this department in the future."



Above, the $2,000 model; right, Othello Dickert at work at his desk.

Model Builder Wins Job

BUILDING airplane models is great fun, but it also can be developed into a business career.

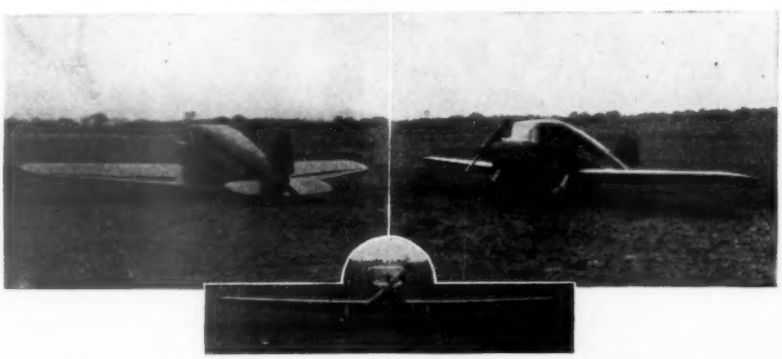
Two years ago Othello Dickert was one of a hundred thousand American boys who entered a national model plane building contest. Now, because his work attracted attention, he is employed by the Boeing Airplane Company making models of military and commercial planes.

He is shown here at work on a model of a Navy plane, while at his left is a completed design of the Army single-seated fighter.

One of the largest models of an airplane built and, incidentally one of the most valuable, was built by Dickert. It is a model of a transcontinental mail passenger plane produced by the Boeing Airplane Company.

The model is correct in every detail and is 1/10th the size of the actual plane and its construction required several weeks. The design, valued at $2,000, is 3.3 feet in length, 1.1 feet high, and has a wing span of 4.4 feet.

Stabilaire Monoplane Has Unusual Features



A NEW type of airplane has been tested successfully at Portsmouth, N. H., by Douglas Livingston. It is the new Stabilaire machine built by Stabilaire, Inc., of Massachusetts.

The Stabilaire plane is of the monoplane type, with a wing span of 34 feet, 6 inches, and a body length of 14 feet, 8 inches from propeller to rudder.

It is 5 feet, 11 inches in height, 42 inches wide, 38 inches deep and is powered with a Szekely 40-horsepower three-cylinder engine.

Total weight of the plane is 590 pounds. In banking during flight tests it was not necessary to use the rudder, the aileron accomplishing this maneuver, while in straight flying it was unnecessary to do more than hold the controls steady.

The plane has practically no vibration at its speed of 85 to 90 m. p. h. The landing speed is approximately 37 miles an hour.

The Stabilaire monoplane can be maneuvered very easily, cannot be forced into a spin, and will not fly on its back. These features are achieved by the design, which places the center of gravity forward of the center of pressure. The plane has no control elevator, longitudinal control being accomplished by a movable stabilizer.

Local Flyer Starts High School Football Game

IN A recent issue of POPULAR AVIATION, Emerson Dellekamp read an article about an airplane being used in Australia to start a football game.

Emerson wrote us to tell about the game started in Shelbyville, Ind., last year by Harold Carson flying an Eagle Rock.

"This year," writes our reader, "our high school began a series of night football games. To dedicate the newly-installed lights, Harold was again called to start the game officially.

"The ship was already fitted with regular running lights, but the pilot added a storage battery and fixed up some automobile headlights on his plane. It sure caused some excitement

Harold Carson standing beside his Eagle Rock from which he dropped the ball.

when the crowd saw the pilot sailing over the field with his plane all lit up! It was very interesting entertainment to everybody. At the proper time he dipped low over the field and dropped the ball within ten feet of the center of the field."

XUM

The "GRAVITEL"

A Radically Designed Flying Machine

"It is a pleasure to accept your kind invitation to announce my proposed design to the readers of your excellent journal."

Charles H. Keefer.

THIS month's cover design is the artist's conception of a hundred-passenger Gravitel. The "Gravitel" is a heavier than air machine designed by Charles H. Keefer and built to rise and descend vertically.

Mr. Keefer has spent 15 years studying this design. The completed ships will cost around $15,000. The experimental work has been carried to the point where success is assured, although the ship has not yet been completed.

The designer is well-known in government circles and at various colleges where he has spoken. Mr. Keefer is being backed on his "Gravitel" by avi-being backed on his "Gravitel" by several business men and bankers.

The machine incorporates the secrets of the flapping bird-wing which the designer found after fifteen years research. He uses the principles of the bird-wing although he does not imitate the birds.

The Gravitel is a machine which by the pull of gravity flies just as a glider does; but instead of waiting for chance currents to recover lost altitude beats down upon the air and thus gains altitude. Upward force is obtained by means of a revolving flap, beating down on the air at a rate of 60 beats per second.

As indicated in Fig. 1, Mr. Keefer's ship is predicated on the following law: With a force lifting the machine the same amount that a force developed gliding down an inclined plane carries it down, the parallelogram of forces shows that the resultant actual line of flight would be horizontal.

As acceleration due to gravity will only be limited by atmospheric resistance, speeds which hitherto have only been dreamed of will be easily attained.

Because no man-made machine has yet traveled five hundred miles per hour, the designer hesitates to fix the ultimate limits of speed his ship could attain.

According to Mr. Keefer, it is easier and cheaper to overcome gravity and utilize it for translation than to overcome asmospheric resistance at high speeds with any sort of pulling device other than gravity.

The details of the propeller-wing and the device by means of which the designer says it will be almost impossible for the machine to fall out of the air cannot be disclosed at this time. Special provision is made to maintain sea level atmospheric pressure at all altitudes for both passengers and motors.

A laboratory model, often demonstrated in lectures, fashioned after this type of propeller-wing, having one-half square inch of blades, develops vertical thrust equivalent to more than 1,200,000 foot pounds per square foot. This particular model, if developed to a square foot of surface, would be impractical as no provision was made to conserve energy. However, it has shown that the power of a 3,000 h.p. motor could be absorbed by a single square foot of surface and the greater part converted into vertical thrust without going beyond critical speed if materials could be found to carry the load.

The larger machines will travel faster than the smaller ones not because of the more powerful motors

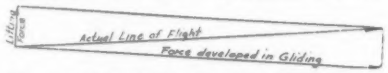


Fig. 1. This simple diagram indicates the acting forces which enable the "Gravitel" to fly.

which they will have, but because of the greater weight per unit of head resisting surface. The greater the weight the greater the acceleration possible before atmospheric resistance prevents further acceleration. When his present design is built he says it will develop many thousands of foot-pounds thrust per square foot of lifting surface, sufficient to climb vertically considerably faster than anything today can climb.

With a given size of machine, the lift will depend on the number of revolutions per minute of the motor as thrust varies with the r.p.m. In different sized ships the thrust will vary in a different ratio with the increased dimensions when the r.p.m. are the same.

The lifting surface of a small four-passenger machine will be between one and two square feet, depending on the motor, and will beat the air about sixty times per second. For larger ships there will be about one square foot of lifting surface for each 200 h.p. motor. The smaller machines should bring Chicago and New York within an hour of each other; New York and San Francisco within four hours and Chicago-Paris within about seven hours, making a round trip possible during a single day.

360 M.P.H. Attained

A SPEED of six miles a minute through the air, greater than any heretofore attained, was recently reached by Squadron Leader A. H. Orlebar, of the British Royal Air Force, at Felixstowe, England, while practicing with the Gloucester-Napier racing seaplane.

A litle more than a year ago Orlebar flew a supermarine Rolls-Royce seaplane at 357 miles an hour in four flights over a three-kilometer course. The flights of the Gloucester-Napier plane, although exceeding the record speed, are not recognized as records because they were not officially observed on behalf of the Royal Aero Club.

German Soarer Built By Students

A CLOSE-UP view of a popular type German soarer. This particular glider, the "Darmstadt," was built by the students of Darmstadt University, Germany.

It was in a Darmstadt that Paul Hesselbach, world's glider championship holder, had a narrow escape from death. He was testing the glider at Highland Light, Mass., hampered by adverse winds, when he was stopped by an obstruction at the edge of a 140-foot cliff overlooking the Atlantic Ocean.

Rubber Glider

TAYLOR McDANIEL (left) and William T. Grady of Washington, D. C., have an altogether new idea for the glider they are building. The framework is of rubber, inflated to rigidity.

When completed the glider will weigh about 125 pounds and they believe it will prove safer than present types now in use. If the glider tests are successful they plan to install a small motor.

How to Build the Heath Parasol

Part II. The Wing Structure and Spars

Specially written for POPULAR AVIATION
by

E. B. Heath.

IN THE first installment of "How to Build the Heath Parasol," started last month, there wasn't a great deal to do. No doubt those that started to build this interesting little plane had no trouble in completing the wing ribs in a very short time.

We are now going to start instruction on how to build one of the most interesting parts of the whole airplane —the wing. When you've finished the next two groups, you will really have something to show for your work.

The accompanying photograph of half of the wing shows just what it will look like when it is completed (with the exception of the covering). And if you don't think the wing you are going to build will be strong, just look at the picture of thirteen men standing on the wing of a standard model Heath parasol. This photograph is of a complete skeleton plane, turned upside down and hung from the ceiling. If you follow the instructions, your wing will be equally as strong.

13 men are testing the strength of a Heath wing.

BUILDING THE WING
Two Panels—13 Ribs Each
By E. B. Heath

The following materials will be needed in building the wings for both bolted and welded types:

V–1. 2 pieces 12 ft. 6 in. each ⅝"x 3⅝" front spars (selected lumber).
V–2. 2 pieces 12 ft. ea.—¾"x3⅜" rear spars (selected lumber).
V–14. 2 ft. ⅝"x⅝" spruce (aileron pulley anchorage).
V–15. 1 pc. 6"x4"x⅛" plywood (gussets for auxiliary comp. strut).
V–37. 14 No. 322 S.F. Turnbuckles (drift wires).
V–38. 2 No. 324 S.F. Turnbuckles (aileron control).
V–39. 2—3/16"x½" N.S. Bolt & H.C. nuts (for item V–38).
V–40. 30 No. 8—32x1¼" Mach. Screws & Nuts (Drift Wire fitts.).
V–41. 48 in. ⅝"x18 ga. (.049) steel strip (drift wire fittings).
V–42. 2 ft. 10 in.—1"x18 ga. (.049) steel strip (drift wire fitts.).
V–43. 1 lb. No. 14 Aviator Wire (Drift Wires).
12 ft. No. 12 Aviator Wire (Drift Wires).
V–44. 24 No. 14 Ferrules (Drift Wires).
4 No. 12 Ferrules (Drift Wires).
V–45. 14—5/32" clevis pins (Drift and anti-drift wires).
V–51. 5—1¾" pulleys (aileron control).
V–52. 2—3/16"x5¼" nickel steel bolts and low castle nuts (aileron pulley anchorage).
V–53. 5 clevis pins 3/16"x⅝" (aileron pulleys).
V–54. 5 clevis pins 3/16"x¼" (aileron pulleys).
V–55. 50 ft. ⅛ in. flexible cable (control cable).
V–61. 1½ ft. ⅝"x16 ga. (.065) steel strip (aileron control fittings).
V–62. 5 aileron pulley housings and shackles.
V–63. 4 No. 4—⅜" wood screws (aileron control fittings).
V–64. 30—3/16" hole washers (Drift Wire fittings).
V–68. ¼ lb. ¾" by 20 ga. wire nails (comp. struts).

Tools

1 screw driver, 1 hand saw, 1 carpenter's square.
1 pair pliers, 1 vise, 1 small adjustable wrench.
1 cold chisel and 1 breast drill with the following bits: 1—17/64 inch bit, 1—3/16 inch bit, 1—13/64 inch metal drill, 1—11/64 inch metal drill, and 1—5/32 inch metal drill.

BEGIN work on the wings with the spars. Square off one end of each spar which you will designate the "butt" end. Then, as shown in your print, at a point ten feet eight inches from the butt end on the longer or front spars draw a vertical line, and at a point one foot eight and a half inches beyond this line draw another vertical line. Mark one edge of the spar, "top."

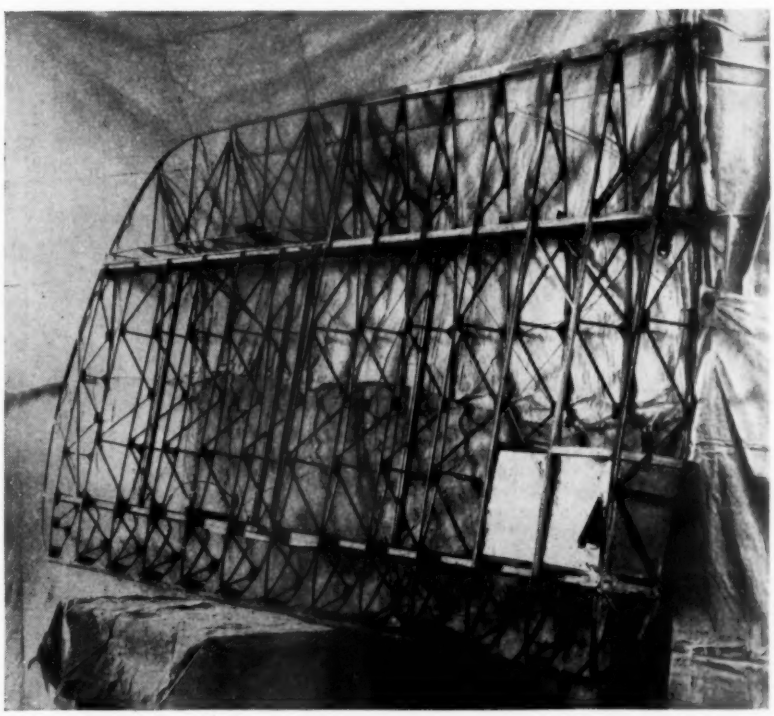
Draw a diagonal line from the top edge of the spar where the first line meets it, to a point three-quarters of an inch from the bottom edge on the second line. Draw another diagonal line from the bottom edge, where the first vertical line meets it, to a point three-eighths of an inch from the bottom edge on the second vertical line.

Saw or plane the spar down to these diagonal lines and you have the proper taper for the front spars. Cut off the front spars to a length of twelve feet four and one-half inches. The rear spars are tapered the same way except that the taper is more abrupt, as you can readily see from your blue print.

The next step is to drill the holes for the machine screws (V-40) which fasten the compression fittings (detail No. 6) to the spar. These are drilled along the center line of the spars with a 5/32" bit. The holes are in pairs, 1⅝" from center to center.

There are three pair in each front spar and four pair in each rear spar. The distance from the butt end, on the

An excellent photograph showing the complete assembly of the Heath Parasol wing. Note the position of the gas tank installation.



front spars to the first pair is three feet five inches and is one and one-quarter inches from the butt end to the center of the first hole on the rear spars.

The two holes for the bolts which fasten the flying strut fittings (details 13-15-16) are now drilled. As your print will show, they are about the middle of the spar on the center line and are three and three-eighths inches apart. Use a 3/16" wood bit for the hole nearest the butt end and a 17/64" bit for the other.

Next drill two 3/16" holes three inches from the butt end and ¼" from the edges on the front spars and three inches from the butt end and 1" from the edges on the rear spars. Through these will be bolted the spar butt fittings (details 1-2-3-4).

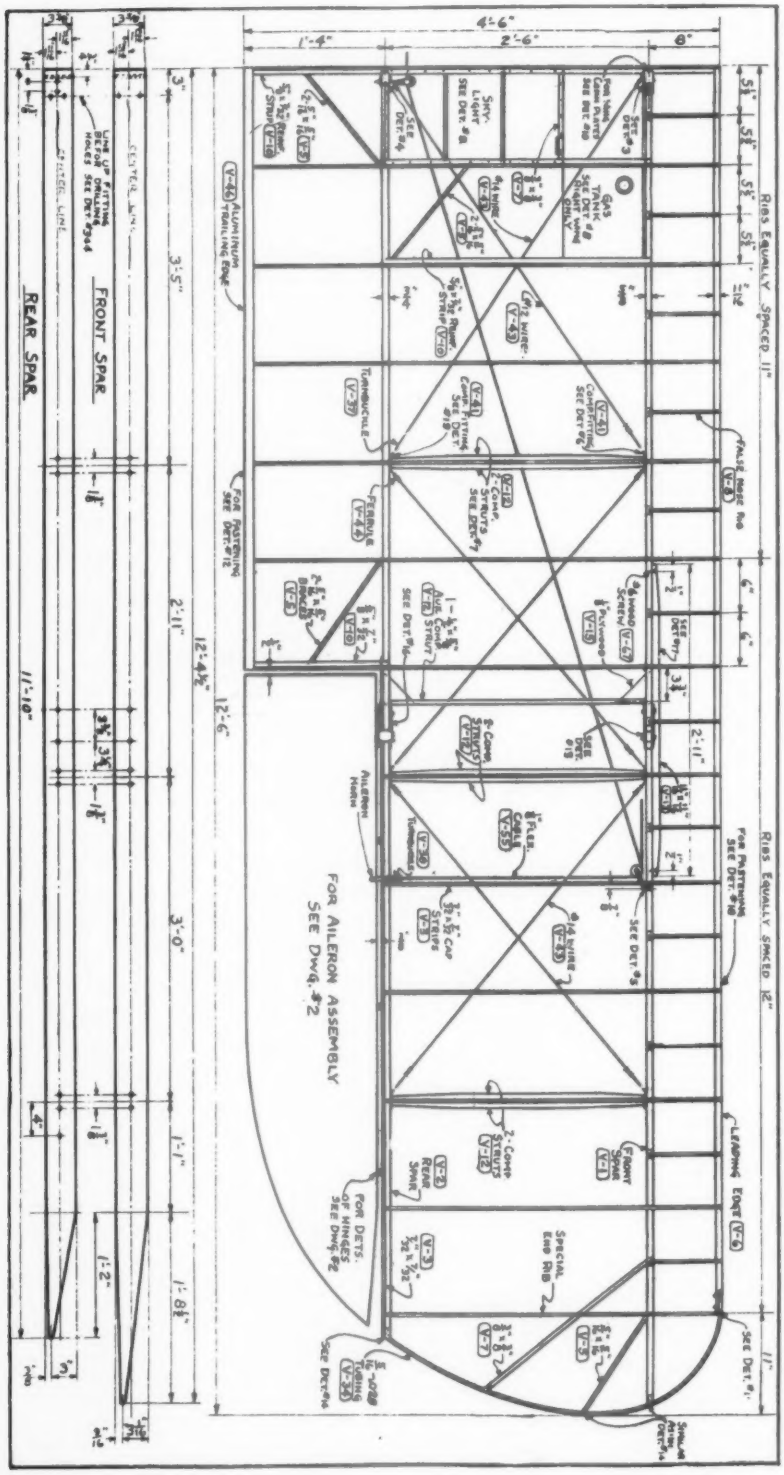
If desired, the holes for the spar butt fittings may be left undrilled until after the fittings have been made and set in place.

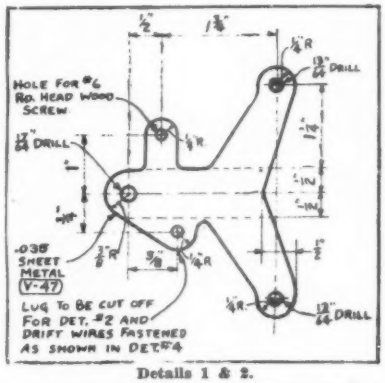
Finally drill the wing bolts holes. Since these holes are drilled from top to bottom through the spars and so are quite long, care must be used to get them straight. Place the butt end of a spar with one of the narrow sides up, in a vise between two other pieces of wood and tighten firmly, taking care not to crush the spar.

Mark a point ¾" from the butt and midway between the edges of the spar, and with a 17/64" bit drill a straight hole ½ the depth of the spar. Turn the spar over and on the opposite side, from a point ¾" from the butt end and midway between the edges, drill a 17/64" hole to meet the first.

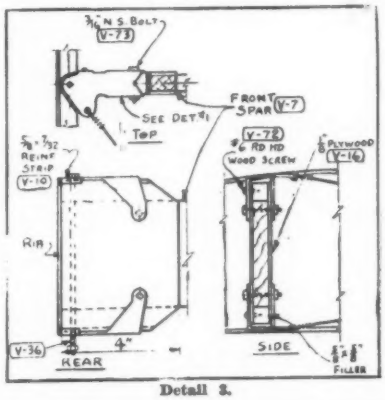
Now pair off the spars. Clamp the

(*Continued on page 54*)

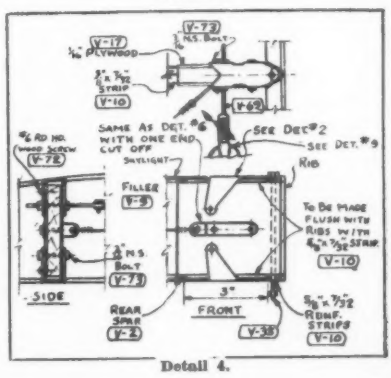



HOLE FOR #6 RD. HEAD WOOD SCREW
.035 SHEET METAL V-47
LUG TO BE CUT OFF FOR DET. #2 AND DRIFT WIRES FASTENED AS SHOWN IN DET. #4
12/64 DRILL

Details 1 & 2.



Detail 3.



Detail 4.

What is The Caterpillar Club?

THE Caterpillar Club originated shortly after the enforced jump at McCook Field, Dayton, Ohio, on October 20, 1922, of Lieutenant Harold A. Harris, the first army flier to jump with a parachute from a disabled aircraft during flight. He was a test pilot and at the time was flying a new type of airplane.

Soon after the take-off he banked his plane to make a turn. The next moment a terrific lateral vibration shook the whole airplane structure. All the skill he exerted in an attempt to regain lateral control proved to be in vain, and he realized that he would have to jump for his life.

When he unhooked his safety belt, the plane was diving steeply toward the ground and he slid into space. Once clear of the ship, Harris attempted to pull the rip cord ring of the parachute in order to open it. But something seemed to be the matter. He looked and could see his feet above his head and the sky farther upward. He was falling head first. Then he found that he had been pulling on a leg strap. Realizing this he located the rip cord and gave a decided yank. The parachute opened.

This incident marked a mile stone in aviation history. Despite the fact that numerous tests had been made with the parachute before this, there was some fear that in an emergency a flyer might not know what to do. Lieutenant Harris disproved this for although he fell over 2,500 feet before he opened his chute, and his head was down and his feet up, he found he could think and act without difficulty.

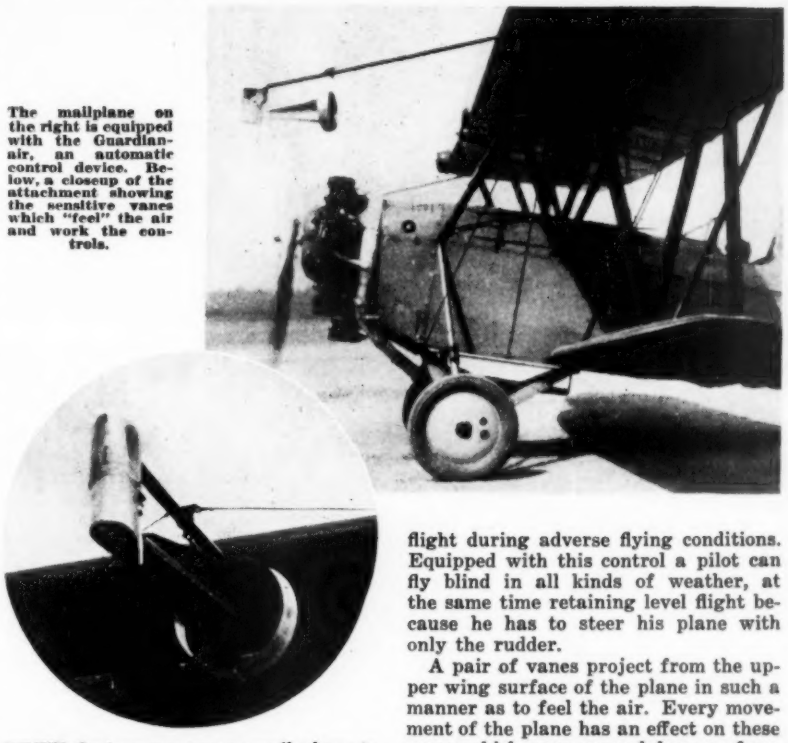
Photographs were made of the wrecked plane, of the parachute, and of Lieutenant Harris and they were sent to the parachute branch of the army and placed in the station at McCook Field.

Then some began to wonder about others who might follow the example of the pioneer and there was a discussion as to a name to be given to them. Many were suggested, such as "Crawlers" and "Skyhookers," until a newspaper man suggested "Caterpillar" as being appropriate.

There is no definite organization as yet of the Caterpillar Club. It is a somewhat mythical group, yet most exclusive. No one seeks to join. The requirements are the same for all, which is that one must practically lose one's life to find it by use of the 'chute. To qualify, a flyer must have saved his life by a forced emergency jump from an airplane in flight.

As the club now exists, there are simply a book of data and statements as to the circumstances of the jump and a picture of the person saved. These are mounted in the Caterpillar album kept at McCook Field. It is semi-official that the insignia of the club is the golden caterpillar nibbling on a mulberry leaf, the whole mounted on a ring similar to the ring of the rip cord.

New Safety Device Used on Mail Planes



The mailplane on the right is equipped with the Guardianair, an automatic control device. Below, a closeup of the attachment showing the sensitive vanes which "feel" the air and work the controls.

THE first passenger or mail plane to fly on a regular run with automatic control is flying on the Cleveland to Pittsburgh route. It is known as the Guardianair, invented by O. W. Green of Elyria, Ohio.

The automatic control is able to land, and take off a plane although the real intention of the inventor is stability in flight during adverse flying conditions. Equipped with this control a pilot can fly blind in all kinds of weather, at the same time retaining level flight because he has to steer his plane with only the rudder.

A pair of vanes project from the upper wing surface of the plane in such a manner as to feel the air. Every movement of the plane has an effect on these vanes which move up and down or from side to side and operate a pendulum arrangement with small cables. These in turn operate rheostats connected to electric motors that operate the controls.

This control has been flown over two hundred hours in tests without a single failure.

Army Planes Practice Bombing

THE rocky hills in the vicinity of Fort Sill, Oklahoma, were somewhat reduced in size by the time some of the expert Army Air Corps bombers concluded their warming-up practice of hurling some of their most modern missiles of destruction.

Three giant Curtiss "Condor" bombing planes from the Seventh Bombardment Group, stationed at Rockwell Field, San Diego, Calif., loaded with an assortment of bombs of various types ranging from 300 to 2,000 pounds in weight, recently journeyed to Fort Sill, hovered over the hills surrounding this famous old Army post, and proceeded to lay their "eggs."

The purpose of this mission of destruction was to conduct an actual test of the functioning of bomb fuses and to ascertain the effectiveness of various types of bombs on very hard surfaces.

Fort Sill was chosen as the site for this demonstration in view of the rocky hills in its vicinity, and because no other suitable area has been found available in the vicinity of other Army reservations in the United States.

England Builds 40-Passenger Ships

THE first of the eight giant 40-passenger Handley-Page air liners has recently been completed in England and is now being tested at Radlett Airdrome. The planes are to be used on the Cairo-Karachi and London-Athens routes, and have been developed from the famous Handley-Page-Napier air liners which have been used for ten years in air service across the English channel.

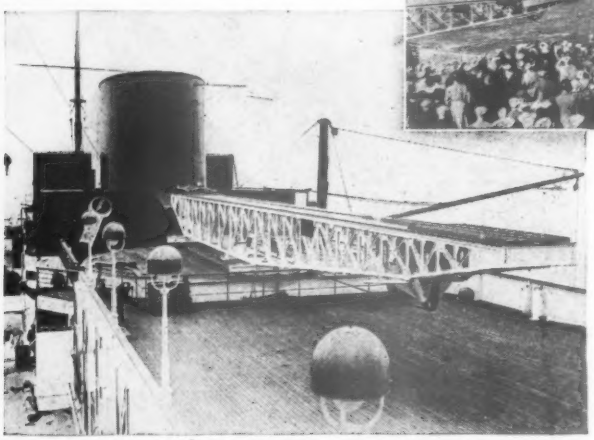
Each of the new planes is divided into seven compartments. First is the pilot's seat in the nose, then the wireless and chart room, behind which is a large lounge accommodating eighteen passengers in comfortable, roomy armchairs. Next comes a bar with seats for six and a further lounge seating another twenty persons. In addition, there are two enormous holds for luggage and freight.

With a full load of passengers and freight, and with fuel and oil for six hours, the machine will cruise at 95 miles per hour, and it has a top speed of 120 miles per hour. The wing spread is 140 feet.

XUM

Details of a Catapault Apparatus

FOR the purpose of speeding up mail deliveries between the United States and Europe, several steamships have been equipped with an airplane catapult apparatus. A plane leaves the ship about 600 miles ahead of the port of destination of the ship, and saves nearly a day's time on the delivery of mail.



Left, a front view of the rail bearer on the Heinkel catapult. Above, the airplane "New York" just as it was being released from the S. S. Bremen.

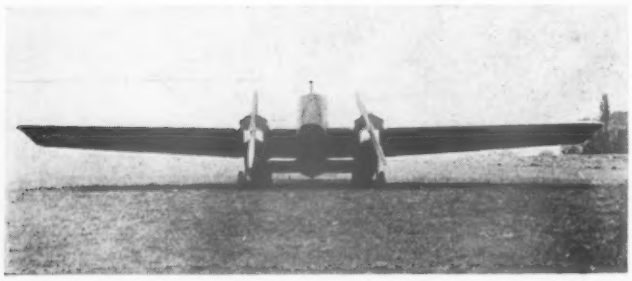
The Heinkel catapult apparatus consists of a railbearer, starting skid, the accelerating unit (by which the plane is given a speedy forward movement), and testing apparatus.

The rail bearer, or launching way, turns on a pivot, so that the planes can be launched into the wind without having to turn the entire boat. The skid glides along the rail bearer on four gliding shoes, and at the skid's front end is attached a drag cable which passes over junction rollers at the front end of the rail bearer and thence connects with the accelerating device which is operated by compressed air.

With the airplane in position on the starting skid, the accelerating apparatus is placed in operation either by the pilot himself from the control compartment of the airplane or by an operator from his position at the control stand of the catapult. Air pressure for starting is varied with the weight of the plane and the force of the prevailing wind. The drag cable must be made taut and held under low pressure before starting, so that no jerks will result when the plane is forced forward under full air pressure.

Full acceleration force results within two feet of the start. A quick release hook, which holds the plane in its initial position, opens automatically, and at the end of the launchway a compressed-air operated braking contrivance stops the skid, but the plane is on its way over the ocean waters.

French War Plane Carries Six Machine Guns



WHAT is supposed to be the most formidable air fighter ever constructed has just been turned over to the French government by the Bleriot Aeronautical Works. Known as the 127M, the monoplane has been designed to protect bombing squadrons from counter attacks.

It is driven by two Hispano-Suiza motors of 500 horsepower and attains a speed of 130 miles an hour. It carries a crew of six—two pilots, three machine gunners, and a mechanic.

The new machine weighs 9,825 lbs. and is armed with six powerful machine guns, of which two are forward and four in the rear. The wing spread is 76 feet.

Automatic Airplane

IT HAS become known, on reliable authority, that a specially-designed motor-driven aircraft was sent up recently from a remotely-situated French aerodrome with no crew on board.

The machine was guided through the air by wireless to a previously indicated destination some distance away, and then a load of bombs which it carried was made to fall. After this the plane turned, still under wireless control, and flew back to its base.

These experiments are the outcome of a 10 years' intensive and costly research. The aim has been to perfect automatic aircraft which, under wireless control, shall take off from the ground, fly in any direction, and then alight, all without a hand at their controls. Today an uncanny success is crowning these efforts.

Its engine started, the manless plane runs a short distance and then climbs exactly as though a pilot was in charge. Up it ascends, balancing itself perfectly, till it is at a height which those launching it have decided upon beforehand. Whereupon, in a way which looks like witchcraft to anyone gazing from below, the little machine ceases to ascend and begins to fly out of sight on an even keel.

As the craft nears the aerodrome a wireless operator on the ground, by a given signal, stops its motor and causes it to glide earthward. Then, tapping out another signal just before the plane reaches ground, the operator causes a wire, with a weight at the end of it, to unroll beneath the machine. This weight, touching ground while the plane is still some little distance up in the air, causes the control-surfaces to set themselves in such a way that the machine makes a smooth, safe contact with the ground.

Primarily, the purpose of the pilotless plane is warlike, to act as a winged, engine-driven bomb, controlled by wireless and launched against distant objectives, but it has a peace-time scope also, seeing that plans are now maturing for using perfected manless planes as automatic carriers of urgent mails.

500 M.P.H. Plane

A "STRATOSPHERE plane" is being built in a special department of the famous Junkers works, in Germany, and the inventor believes it will fly at 500 miles an hour at an altitude of 50,000 feet—thus making easily possible a trip from Berlin to New York in eight hours.

The experimental plane is being built for the purpose of trying out new principles and theories advanced by the inventor, whose name is not mentioned, but who is not connected with the Junkers organization, which latter fact is cited as evidence that the new plane possesses merit. The plane, it is said, will have a motor and propeller different from those of ordinary design.

Spotting Mines from a Balloon

Unhonored and practically unknown, the mine-sweepers cleared the seas for commerce. Danger and excitement faced the balloonists who directed the search for sunken mines.

by

LIEUT. AUDREY L. C. WHITE

BEING up in a kite balloon, towed by a ship across mine infested waters, is perhaps not one of the most pleasant of sensations.

Nor does it improve one's peace of mind to realize that possibly the slightest move of the rudder or propelling mechanism may be sufficient to cause the boat to touch one of the horns of the mine and blow it to pieces.

The nervous tension of the men in the balloon overhead who are directing every move of the ship below them by telephone is often very great and frequently the safety of the boat, when operating in these mine fields, is in their hands. Yet such are some of the many experiences which many of our mine spotters went through after the war in cleaning up the seas and making them clear for peace-time navigation.

It will be remembered that large numbers of mines were laid during the war by the Allied Powers and the enemy countries as well. The largest and most important of these mine fields were in the North Sea, the Eastern Mediterranean and the Ægean Sea leading to the Dardanelles.

In the North Sea, the Northern Barrage, which extended from the Orkney Islands to a point off the Norwegian Coast, was laid by American mine layers, while British vessels laid their mine fields off the Dogger Bank. In all, it is estimated that there were as many as 500,000 mines laid in the North Sea alone.

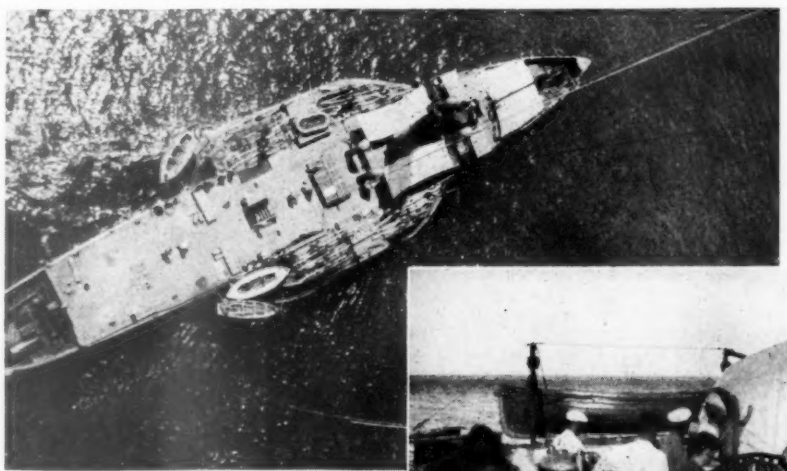
In the Eastern Mediterranean and in the Ægean Sea there were large mine-infested areas, the worst of which were around the approaches to the Dardanelles, which were laid by both British and Turkish mine layers during the war.

A few months after the signing of the Armistice the Allied Powers decided that no time should be wasted in sweeping the seas of these mine-infested areas. The work of mine sweeping was a very dangerous one, since the boats engaged in this work could at any time set off a mine and be blown up. This happened more than once. All of the men who served on these boats were volunteers who were willing to take the risk and carry on this very important task of clearing the seas and opening them up again for peace-time shipping.

Little has ever been written about these men who, day in and day out, swept the seas in all kinds of weather and at great risk in ridding the commerce lanes of the dangers that lurked below the surface of the waves, yet their work was long and exhausting and they are among the unsung heroes of post-war times.

In the North Sea the Americans and British swept their own mine fields. They knew definitely where the mines were located, so that this task, while it took some time and was fraught with great risk, which in more than one case proved disastrous, did not present the problems that confronted those who were engaged in the same work in the Ægean. In this sea the British mines were originally laid hurriedly, at night, and under gun fire, so that it was difficult for those who laid them to be able accurately to indicate on charts where they were laid.

It was known that tens of thousands of mines were anchored just below the surface of the water and we realized that it was practically suicide for any boat of average draught to put to sea there. Though other nations offered their assistance in the sweeping of these mine fields, it remained for the British volunteer crews to do the actual work.



Above, the mine spotter's view of the H. M. S. Duchess of Norfolk. Right, deflating the kite balloon after a day's work at sea. Note dam buoys at right for marking spots where mines are found.

WE HAD a small fleet of about thirty mine sweepers and twenty auxiliary vessels. The boat on which I served after my experiences in the North Sea was an old paddle-wheel vessel which was used as an auxiliary ship and known as H. M. S. Duchess of Norfolk.

Before the war this boat was used in the service between Southampton

Transferring a kite balloon from shore to ship at the R. A. F. Base on the Isle of Imbros.

and the Isle of Wight by the old London, Brighton and South Coast Railway and had been converted for its service as a mine spotter, being fully equipped for balloon work.

All of the officers and men on these boats were for the most part experienced mine sweeping men, a number of whom had had previous experience in the North Sea. In my case, I had gained experience with Vice Admiral L. G. Preston, C. B., who was the director of mine sweeping of the British Navy.

After studying the situation in the Ægean, it was decided that it would be entirely impractical to attempt to clear that sea and the approach to the Dardanelles without the assistance of kite balloons, and the use of these "sausages" proved absolutely invaluable in the spotting of these mines.

In the North Sea the use of balloons was not necessary, for the lines were more easily picked up, but here in the Ægean, as has been mentioned, the men on the sweepers had little to go by with their very inaccurate charts. At any time these mine sweepers might be blown up while steaming through these mine-infested waters and, despite the valuable assistance of the balloons, work, especially on the fatal N-3 line a number of these ships were lost at near the Dardanelles.

The balloons we used were obtained from the R. A. F. Base at Kephelo, on the Isle of Imbros, which was General Ian Hamilton's old headquarters in the Dardanelles. As a rule, we were towed behind the ships at an altitude of about 800 feet, which was considered the best altitude for visibility in spotting mines under water.

Our usual equipment consisted of a telephone for communication with the ship, a parachute and a pair of binoculars. Of course, the parachutes were of little use at our altitude when mine spotting, for they were carried in case of emergency in the event that the balloon should break away in one of the frequent storms that we had to contend with, and go up. It gave the balloon officer a chance to get down if there was no other way.

Since we were working in a very hot climate it little mattered what one wore while up in the balloon and frequently a pair of shorts formed a part of our attire.

On an average we spent about six hours at a time up in the balloon, though on one instance I was up for fourteen hours without coming down. This was literally from dawn to dusk, for at the time we were sweeping a very bad area where mines were being spotted in all directions. It seemed at times as if our ship below would at any moment be blown up.

TO PUT it mildly, this was extremely nerve-wracking business and the safety of every man on the ship below often depended on what the balloonist was able to see under water and the directions he was able to transmit to the bridge.

During those summer months dawn broke early over the hills and mountains along the shores of the Ægean, and as soon as we had sufficient light we were able to send up a man and resume operations. We had daylight to work in until quite late in the evening, so that our hours were frequently long.

It was exhausting work, being suspended in a small basket below the big swaying gas bag concentrating continuously on the surrounding sea for hours on hours. Yet there was no rest for this work had to go on ceaselessly in clearing the sea for shipping to and from the Orient and reopening the port of Constantinople. Usually one officer was sent up, though sometimes two and even three went up.

The usual procedure in spotting a mine with the glasses was to phone down to the ship and report its location, such as "Mine bearing green at ninety degrees," or "Line of mines bearing red at, forty-five degrees."

The terms green and red were understood to mean starboard and port respectively by the officer on the bridge, while the degrees indicated the angle of direction in which the mine lay from the ship. It was necessary to direct the ship from the air, as without the use of the balloon the ship would be blind as to what was under water. Often, though, the mine could not be seen until the ship seemed to be almost over it, for rough water or very overcast skies interfered with good visibility considerably.

When we could pick up a line of mines we were fortunate, since the mine sweepers who swept the sea behind us could destroy a number in succession. It was our duty as a spotting ship to mark the spot where we had found submerged mines by dropping over dam buoys. The mine sweepers picked up the location from the buoys and swept the sea criss cross with their long cables until the mines were broken

Here we see the observation balloon about to rise from its ship off the Aegean Coast.

from their moorings and floated up to the surface.

Once up, they were fired at and exploded. Rifle fire was often used for exploding the mines, since they were usually destroyed at close range.

During our operations over the Ægean with balloons, our men were continually hampered in their work by violent thunder storms. These storms often came up suddenly and without much warning and were usually accompanied by fierce squalls that made things anything but pleasant for the man in the balloon.

The balloon, when hit by these sudden gusts of wind, pitched and rolled and strained on its cables so much that it was very difficult for the balloonist to carry on with his work. More than once have I been up over a very thickly mined area of sea directing the ship when storms have come up. It takes no great stretch of the imagination to realize how one must feel when supported in a basket beneath a heaving, lurching gas bag containing 32,000 cubic feet of highly inflammable hydrogen gas with lightning flashing all around you!

It was often impossible to get the balloon down on deck on account of the wind, so that the balloon officer was forced to stay up and enjoy the beauties of nature as best he could.

As a rule, the balloon was up all of the time and only lowered to the deck for the balloonist to get in or out or for inflating or deflating. The balloon was safer in the air when not in use than when on deck, for these big ungainly gas bags were great targets for the vagaries of the wind.

The bags were usually refilled with hydrogen gas every two or three days, either at the base on the Isle of Imbros or during the night if we were at sea. In this warm climate the gas supply needed replenishing often as the balloon always leaked a little.

(*Continued on page* 56)

How to Demonstrate an Airplane

by

GEORGE W. HALDEMAN

Chief Pilot, Ballanca Aircraft Corp.

There is an art to every trade. Selling airplanes is no exception. George Haldeman, trans-Atlantic flyer, tells how he high-pressures his prospects.

DEMONSTRATING an airplane is a kind of art like every other highly specialized activity in the world. The man doing the demonstrating must be completely familiar with the plane and its capabilities in order to put it through its maneuvers smoothly, cleanly, without effort and with certain knowledge of success in each maneuver attempted.

Some prospects are interested in different aspects of performance than others. The staid business man is impressed more by a smooth, steady ride than by quick takeoff or rapid climb, but at the same time these points cannot be ignored. So I have figured out a more or less flexible schedule for demonstrations. That is, there are certain points to put over with all prospects whether familiar with planes or not, and there are certain additional points to bring to the attention of experienced pilots, if it happens that the prospect is a pilot or if there is a pilot in the party to which the demonstration is being given.

Briefly, my program is as follows: I first take care to impress on every member of the party that the ship is capable of carrying many more people than there are seats for, so that at no time can it be overloaded. As evidence of this, I point out that the "Pacemaker" which I flew in the Ford Reliability Tour of 1929, and which won first place among single-engined cabin airplanes, carried a load of 2310 pounds, which is equivalent to the weight of ten passengers in addition to the pilot and full tanks of gas and oil.

While taxying preparatory to taking off, I attempt to convey without appearing to do so the wonderful ground maneuverability and control of the ship. It can be taxied very fast and shows no tendency to get out of control or groundloop, answering immediately to the application of rudder and brakes and swinging around easily on the free-swiveling tail wheel. I am careful to see that all these points are brought to the attention of the prospects without convying the impression that I am handling the ship in any other than the normal everyday manner.

THE takeoff and climb is one of the most impressive aspects of the performance. There is no need to strain every nerve to horse the ship off the ground as soon as possible or climb it to the very limit of its ability. As a matter of fact, I like to keep it well within its abilities in this respect and to attempt to get the impression over to the prospects that there is ample reserve in addition to the really remarkable performance they are experiencing. It always makes a very decided impression to get off the ground in six and one-half seconds, climb an honest thousand feet a minute and at the same time have the prospects feel and believe that the ship is not being worked to the limit but could do still better if the pilot wanted it to.

The Bellanca Pacemaker. A 6-place Cabin Monoplane with a 300 h.p. Wright J-6 Nine Cylinder Engine.

In the air there is plenty to show the prospects and I'm always better satisfied if we have plenty of time to stay up and go through the thing thoroughly. First there is speed, and as the "Pacemaker" flies 145 m. p. h. at full throttle, I have no hesitancy about straightening the ship out and letting it run for five or ten minutes at full gun. When I'm sure they are all convinced of the speed of the ship I throttle it down to 1750 r. p. m. and we cruise along at 122 m. p. h. while I proceed to trim the ship for level flight and then turn loose all the controls. Now is my chance to turn around in my seat and see how things are going. The prospects look questioningly at me and then at the controls and finally out of the window to assure themselves that the ship is really continuing straight as a projectile on its course. When they are all satisfied as to the ability of the ship to fly itself without the pilot's hands or feet on the controls, I demonstrate turns using rudder alone and turns using ailerons alone both right and left.

By this time the prospects are getting quite enthusiastic and beginning to tell me what a hot airplane the "Pacemaker" is, but the most impressive part of my demonstration has not yet been exhibited.

If there ever was a plane that is really a "floater" the Bellanca "Pacemaker" is it and this characteristic is, in my opinion, more impressive to the average layman and even, as a matter of fact, to pilots of long experience than any other.

With the motor throttled, the "Pacemaker" appears to actually hang in the air. It is quiet, so that conversation is easy. It is smooth, steady, and apparently level. It is gliding, of course, but at such a slight angle as to be almost imperceptible to the occupants.

The psychological effect of thus floating in the air free from the tremendous pull and power impulse of the motor which, while it is running, cannot do otherwise than make the uninitiated person feel that he is being hauled through an element where he doesn't belong and likely any minute to drop to destruction, will eliminate forever after a few minutes the innate fear of the most timid person.

For quite a while I like to just sit there half turned around in my seat and chat about the ship, the weather, or anything in general. If the prospects are new to the air, I enjoy seeing the gradual easing of tension, the relaxing of muscles, and to find them at last really and thoroughly enjoying themselves. Then I know that I have made some more aviation enthusiasts for life.

The final point I demonstrate in the air is the non-stalling and non-spinning characteristics of the "Pacemaker." I know it won't show any tendency to spin, so I put it through the following maneuvers without hesitancy:

With the stabilizer set for the tail-heavy position and with the motor throttled, I pull the ship up into a stall and then turn loose all controls. It shows no tendency to fall off on either wing, but mushes forward regaining its flying speed in exactly the same direction. The ship continues ahead stalling and regaining its speed in a continuous series of short stops. After a few minutes of this, I hold back hard on the stick in a stall and kick full rudder, first to the right and then to the left.

If a pilot is among the party he may feel uncomfortable during this maneuver as he will know that this is the most effective way to start a spin. But the "Pacemaker" does not spin. With the rudder held over hard the nose drops and the ship straightens itself out in a gradually decreasing glide.

After this maneuver has been executed two or three times, any prospect is thoroughly convinced of the freedom from spinning tendencies of the "Pacemaker."

ANOTHER point I never fail to bring out with the "Pacemaker" is the postive aileron control in a stall. With the ship again stalled and the stick held hard back, I rock the wings by moving it to right and left and

XUM

never fail by this maneuver to elicit words of surprise from the occupants of the other seats that are familiar with aircraft.

The method I use in landing after a demonstration flight again is dependent upon whether the demonstration is being made to a pilot or to laymen. If to laymen, I come in in a normally long glide and set the ship down so that its low landing speed shows up to the best advantage and by applying the brakes hard the ship comes to rest after a very short roll. At a recent demonstration with myself and three passengers in the ship, full tanks of gas and oil and with 250 pounds of sand in the baggage compartment, I landed and stopped rolling in a measured distance of 168 feet.

If the demonstration is being given to a pilot I come into the field quite high on purpose. Due to its ease of control, the "Pacemaker" sideslips very effectively and I like to make certain that the prospect observes this feature.

If the prospect is a pilot, I always urge him to take the ship and do the same things both in the air and on the ground that I do, so that he can assure himself that I had nothing up my sleeve. Even if the prospect is not a pilot, I like to have him take over the controls in the air and see for himself just how easily and beautifully the ship handles.

In all my demonstrating, I feel it to be of prime importance to convey the impression that I am not working hard to get the last ounce of performance out of the ship, but rather to make the prospect feel that what the ship does, it does without effort or strain and with ample reserve to meet all contingencies.

War Pilots Equipped With Useful Weapon

DURING the late war, certain aviation units in the A. E. F. were equipped with barbarous looking knives called "trench daggers." These were to be used should the pilot be forced down in enemy territory.

Trench daggers are about the size of ordinary stilettoes. They were especially adapted to hand-to-hand fighting. Kept sharp as a razor, frequently carrying a jagged edge, they proved deadly weapons.

The most interesting feature of the "trench dagger" was its brass knuckles. Often the grounded pilot found himself too close to his enemy to take a stabbing or slicing stroke. He could then close his brass-knuckled fist, and take a swing at his opponent's jaw.

Zeppelins May Be Equipped With Pontoons

A DIRIGIBLE on pontoons may seem, at first thought, a startling innovation, but it is not. It was the original and first conception of the airship. The first Zeppelin and the British Mayfly were both designed to operate from the water.

The dirigible as at present designed is not wholly satisfactory. To begin with, the dirigible can only make a landing at a specially prepared base. This means that engine trouble or other misadventure may be very serious indeed, particularly if it happens some hundreds miles distant from the nearest base.

The experience of the Graf Zeppelin in her attempted flight across the Atlantic in May, 1929, is a case in point. The ship's engines broke down, and it was with the greatest difficulty that she managed to get back in safety.

The ship has to be moored at a mooring mast—an elaborate structure, which costs a great deal to erect; and may have to wait some days in this position before the direction of the wind permits docking in the hangar. Nor is this all. As the dirigible can only be handled by man-power, the actual operation necessitates the employment of several hundred men in the ground crew, who have to stand by for that purpose.

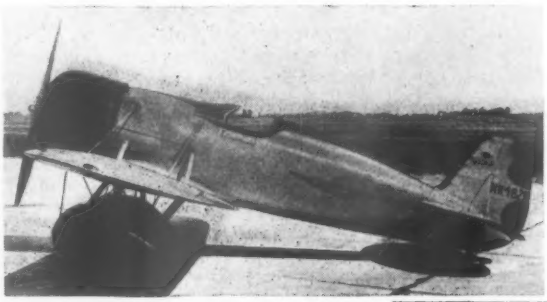
The problem that lies before the builders is how to redesign dirigibles so that they will be able to come down in the manner of a flying boat, and be moored to a buoy, or lie at anchor like a marine vessel.

It is a technical possibility to construct an airship of the type suggested. The design which has recently been worked out by the builders of the R100 has passed preliminary model tests so satisfactorily as to leave little doubt about the practicability of the conception.

The basic idea of the new pontoon-equipped dirigible is to keep the ship under control by means of rudders and elevators, until it can be securely held, and is no longer in danger of being blown over by a side wind. To achieve this, two long floats, similar to the hulls of flying boats, but much larger, will be constructed under midship. These are fitted with ballast tanks, and fixed to the hull, as far apart in a transverse direction as possible.

At the same time, the section is altered from the standard circular to an elliptical section. This reduces the overall height, and lessens resistance to side winds.

Scale Drawing of Travel Air Mystery Ship

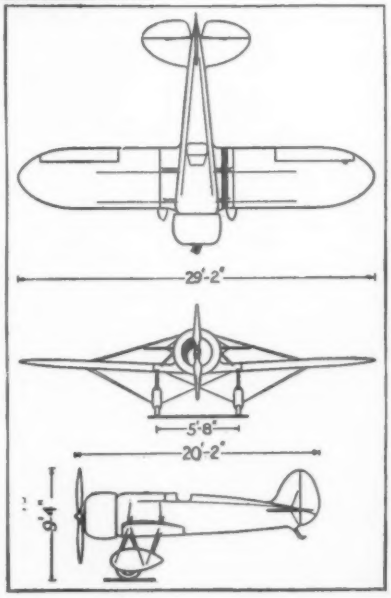


This drawing is the first of a series of scale drawings of popular airplanes. Model builders will find these plans of much value.

TRAVEL AIR MYSTERY SHIP

Low wing one place open cockpit monoplane, powered with a Wright Whirlwind 300 h.p. engine.

Fuel capacity	47 gallons
Span overall	29 ft. 2 in.
Length overall	20 ft. 2 in.
Height	7 ft. 9 in.
High speed	235 m.p.h.
Cruising speed	150 m.p.h.
Landing speed	70 m.p.h.
Service ceiling	30,000 feet
Cruising range	525 miles



License Statistics

A STUDY just completed by the Aeronautics Branch of the Department of Commerce shows that on September 30, 1930, there were 14,425 aircraft pilots holding licenses issued by the Department.

It is also shown that 977 gliders, 118 glider pilots, and 8,979 mechanics had been licensed and 8,893 aircraft had been licensed or identified.

It is shown that New York was first on the list of licensed or identified aircraft with 1,119, but California had the largest number of pilots, mechanics, gliders and glider pilots.

Accidents Will Happen!

by W. L. OLIVER
President, Menefee Air Service.

Serious accidents frequently result from the most trivial beginnings. From the wealth of his experience, Mr. Oliver recalls many crack-ups and analyzes their causes.

NOW and then a pilot will try to prove to his friends and admirers on the ground that he can fly any old ship, any old place, any old time. Well, it can't be done.

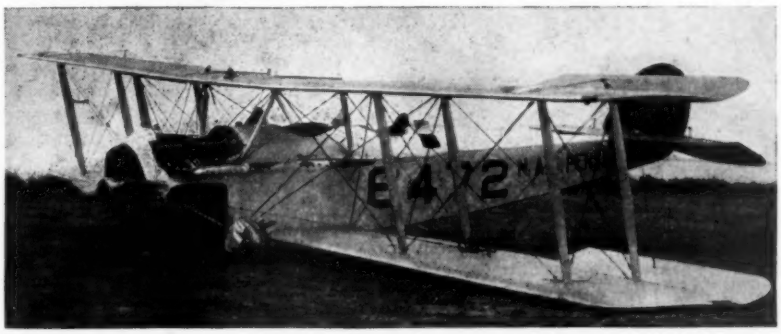
The writer once saw a Marine Corps officer who, it was whispered, had had a drink, take off down wind and nearly crash a beautiful new Curtiss Hawk, fast pursuit ship of Army, Navy and Marine Corps. This little ship, literally loaded with power, has a top speed of over 180 miles an hour and lands at over 50 miles an hour. It needs an equal speed to get off the ground.

The Marine, faced with the necessity of getting off the ground at once or taxying down the runway with a 20-mile wind sweeping on the tail of his craft, decided not to taxi. Decisions like these make wonderful fighting pilots but cost the government a lot of money in equipment.

Gunning his motor all the way out, the marine quickly caught up with the wind. When he did so the only control he had was that given by the powerful slipstream of his propeller flowing over the empennage or tail assembly of his craft. His wings being then in still air, all lateral controls were useless.

A slight hump on the runway deflected one wheel and before the flier could catch control, the little ship was headed off the runway. Too much rudder, too quickly applied, brought it swinging back and reversed rudder sent it off the runway again.

A crowd of nearly 10,000 people who were taking the Sunday afternoon for an outing to see the stunts in the skies over the airport, suddenly decided that they would probably see the day's major stunt there on the ground.



Sometimes it's motor trouble, but in this case, the results of a flat glide would seem to indicate "pilot trouble."

The Marine, on the verge of a ground loop, finally gained control of his ship and shot it off the ground. He evidently felt a little sheepish, however, for he went riding for five or six minutes before coming back to the airport. There were no more downwind takeoffs from that airport that day.

One pilot a year or so ago had just come down and, thinking he would not use the ship for an hour or so, cut off the gas from the tank and thoughtlessly switched off the engine before draining the line.

He had occasion to go up a few minutes later. Forgetting the closed gas cock, he started his motor, still warm, and started off.

He was just leaving the ground when the last of the gas in the feed line was exhausted and the motor stopped. Fortunately his runway was long and he could "set right down."

Another equally absent-minded pilot was not quite so fortunate. This pilot, a student flier, came out for his fourth or fifth solo flight. He was directed to the ship he had been using, which had just been brought down after a dual instruction flight. No one warned him to open the gas cock. He forgot—and his forgetting cost the owners of the plane a thousand dollars.

The student gunned his plane almost as soon as he left the apron, or concrete runway at the hangar doors. He was off the ground and nearly fifty feet up before his motor stopped. He was too new at flying to act instinctively and too excited to think, but managed to put his ship at a very flat gliding angle.

The gliding angle was just a bit too small, or too flat, and when he was still about 25 feet high, the plane stalled and fell.

The flier was unhurt, beyond a few minor bruises and cuts, but the fuselage of the plane was so badly twisted and the wings so badly damaged that the craft had to be sent to the factory for repairs, with a resultant bill of about $1,000.

This plane was once owned by W. L. Oliver. He sold it but the new owner didn't keep it very long.

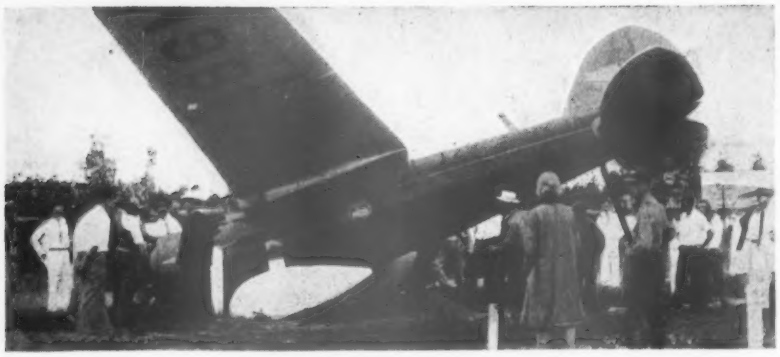
GROUND hazards are manifold and every one near a flying field is a potential death trap to the flier. There may be a shallow ditch running diagonally across the far end of a runway. The ditch, like smallpox, may be all right unless you touch it, but if the motor stops, or the air is "light" on a hot day and the motor is not "revving" up to its maximum, the ditch may prove the last road leading to St. Peter's gate.

High tension wires form another cause for worry. If they happen to be strung near the end of a runway you will find veteran pilots, forced to take off in that direction, swinging their craft in a low bank away from the heavy voltage as soon as they get off the ground.

Trees, singly and in phalanxes, may prove deadly. In a plane taking off across the wind, the pilot may lapse in attention for just a moment and let his windward wing creep up. A gust may sweep the craft 50 or 60 feet diagonally off the runway in the beat of a humming bird's wing. A tree near the runway would cause another tragedy.

Jess Menefee, wartime flying instructor at Kelly Field and veteran barnstormer, once wrapped a Waco around a small tree while dodging a larger one close to the line of his takeoff.

Menefee was barnstorming—hopping passengers from a temporary field—in Southwest Virginia. He was in a mountainous section and the only field available was a small, rolling plot of ground



Even the best of flyers will occasionally have an accident. Brock and Schlee, trans-Atlantic flyers, nosed over in their Lockheed at the end of a transcontinental flight.

with a dozen or more trees spaced at embarrassing points.

Menefee did not like the prospect of flying from the field, but his associates insisted that the till was nearly empty, money was money, the natives thereabout had it and they might just as well collect.

A dozen passengers were taken on short rides, without incident, and the flier was breathing a bit easier. A slight breeze had arisen, sweeping across the small space he had selected for taking off, and the pilot decided he would have to pay especial attention to a tall poplar on the lee side of the temporary runway.

With this in mind, and in view, he started off. Holding his left wing, on the windward side, a little low to prevent a swing toward the poplar, he failed to see a small tree on his left.

The Waco had barely got off the ground when the left wing, about two feet from the tip, struck the small tree. No time for the pilot to ponder. He shoved the control stick to the left, depressing the aileron on the right wing and giving added lift to that side. The plane swung around the tree, then dropped.

It was badly wrecked, but nobody was seriously hurt. The flier had figured in that fraction of a second that unless he brought his outside wing up in a climbing arc the ship would crash on its back, with probable fatal results to pilot and passengers.

"LIGHT" air cost Ivor Massie, former pursuit pilot overseas, about $1,500 one hot day in the summer of 1928. Massie is a "precision flier" of unusual ability, having won the trophy for landing closest to a mark at an Army flying field some years ago.

On this particular day he had no mark to shoot at, but was forced to land his ship on one wing and break the fall as best he could.

Massie took off near his home in a light commercial three-place ship, with the intention of flying to a neighboring town on a short barnstorming trip. He had a full tank of gasoline, nearly 40 gallons, but had no difficulty leaving his home field.

He reached his destination, but found that the wind had changed and to use hoped for the best. The ship was torn into an almost unrecognizable wreck, the field he had selected would necessitate down wind takeoffs, aided slightly by a small downgrade. Advance advertising among friends in the little town had brought a crowd to the field and the flier made several trips, rising with difficulty at the far end of the field each time he took off.

Heat seemed to be sending the air skyward in waves and the pilot decided that conditions would be unfavorable to flying long before the sun reached its meridian. But he would make one more trip. Two heavyset diversion seekers were next. They climbed into the plane and Massie started off.

The extra weight of the two big men, besides the pilot, plus the loaded gas tank, held the craft on the ground until the end of the field had been reached. The flier stalled his ship a few feet off the ground, then, as it wavered, a six-inch maple tree seemed to swerve into its path. The pilot shoved his stick far to the side, just before pulling it back into his stomach for a flipper turn, or turn with elevators acting as rudder. But the air was too light or too thin and gave too little lift, the load of gas and men was too heavy, the altitude too little—and the ship crashed.

As he saw the inevitable, Massie ruddered down to catch his wing on the ground and break the force of the fall, snapped off his ignition switch and

Jess Menefee whose quick action saved himself and passengers when he wrapped his Waco around a tree.

from the standpoint of wings and undercarriage, but the steel fuselage was only slightly damaged. The fuselage saved pilot and passengers and again only a few minor injuries were suffered by the skyriders.

ACCIDENTS due to structural failures at the takeoff have perhaps proved even more costly in lives and equipment. In justice to the many air transportation companies it should be pointed out that these mishaps, in licensed planes flown by licensed pilots off government-approved airports, are comparatively rare.

But in barnstorming, anything can happen. Likewise in the Army, Navy and Marine Corps air services where war conditions often are simulated.

Four men died in May, 1927, when a Martin bomber crashed on the takeoff at Augusta, Georgia. The ship was one of 13 in a squadron, part of a fleet of 102 planes in a giant movement of Uncle Sam's air forces. Second Lieutenant Dan F. Voorhees of the Army Air Corps was piloting, while with him and at their stations in the ship were Staff Sergeant Clifford Wrenn, Staff Sergeant James Read and Corporal Melvin Andrews, Jr.

Where a machine is powered by two motors, as in several types of bombers both in this country and abroad, the pilot has to be watching his P's and Q's when either one is in trouble.

Just as there is torque in a single-engined plane, tending to roll the craft over on its longitudinal axis in a direction opposite from that of the rotation of the propeller, so in multi-motored planes there is a similar tendency noted about the vertical axis when an outside motor cuts out.

Designers abroad, notably in Italy, have succeeded to an extent in dodging this difficulty by placing their motors, in a twin-engined plane, in tandem. The motors are placed one ahead of the other, the propeller of that behind working in the slipstream of the forward propeller. Torque also is eliminated, for the propellers turn in opposite directions and the torque of each engine offsets that of the other.

Lieutenant Voorhees had taken his craft about 500 feet off the ground when one of the motors conked. The country ahead did not seem suitable for a landing, so the pilot turned with his one motor and attempted to reach the field he had just left. He seemed about to make it when, at an elevation of 200 feet, he lost control and the bomber dropped.

It crashed into a line of high-tension wires—those wires seem to be plentiful in the vicinity of flying fields—the gas tanks exploded and the ship was on fire before it hit the ground, a quarter of a mile from where it had taken off.

BUCK SPANNAGEL, a former army flyer, had a goose-flesh experience with a fouled fuel line. His trouble arose from an errant bit of solder from inside the gasoline tank. This tiny bit

(*Continued on page* 64)

Some Pointers on Parachute Jumping

JAMES K. CLARK, of the United States Air Service, is another of that daredevil crew who leap out of planes with a bit of tricky silk tied to their backs—and live to leap again.

"Like the first hundred years of life, the first jump from a plane in the air is the hardest," said Clark, whimsically, while reviewing some of his experiences. "The leap-off takes only a moment—but it is probably the longest moment the one who lives it ever knows in all his life.

"The first time you don't, as a rule, jump off; you're pulled off. No matter how nervy you are or how well trained, you hang on with desperate strength until the very last.

"The pull-off is more unpleasant than the jump-off, though possibly not quite so dangerous. The jerk you get when your body is suddenly dragged off the wing of a plane going at a speed of a hundred miles—or more—an hour, is a bit severe, though it doesn't hurt you. In the jump-off you merely do a few somersaults and then are brought up suddenly, but not harshly, by the unfolding bag.

"I have fallen a thousand feet or more before letting the parachute go. One man fell 2,700 feet before releasing the bag. If you started high enough from the ground, you might fall five or ten thousand feet with the parachute still folded on your back, without being hurt.

"The old belief was that a person falling from a great height is suffocated or killed by shock before landing. I think that we have demonstrated clearly enough that this is untrue. About the only sensation a parachute jumper has when falling as fast as gravity will pull him—at the start the speed is about thirty feet a second, but it increases to hundreds of feet a second before he has fallen a thousand feet—is of air rushing by him like a tornado. But it doesn't take his breath or irritate exposed parts of his body.

"Usually, until the parachute takes hold, we tumble over and over. This can be avoided by dropping off in a crouching position with our arms clasped around our knees. The tumbling, however, is not unpleasant, nor is the jerk that breaks the fall when the parachute inflates and takes hold. Of course, the farther we fall before opening the 'chute, the more severe is the jerk; but even at that it is sort of like falling into a huge feather bed.

"Unless conditions be unusual, a jumper might read a book while coming down after the parachute is put to work. The only thing to worry about then is the landing. If he gets tangled with a tree top or doesn't hit earth properly he may have to nurse a broken bone or two."

Clark ought to know. He has made many jumps without getting so much as a scratch to remember them by. "I'd

(*Continued on page* 57)

The Aeronca Lightplane Motor

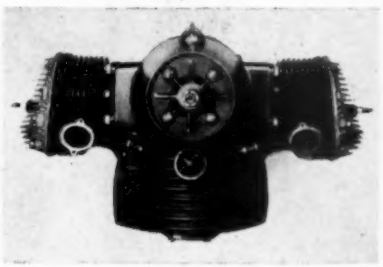
THE performance of the Aeronca C-2—in fact, the plane itself—would never have been possible without the specially designed air-cooled Aeronca E-107A engine. The development of this motor dates back to 1926.

In outward design this motor is made to fit exactly into the slip stream, making for minimum head resistance. It has two opposed cylinders at 4⅛-in. bore and 4-in. stroke, and is rated at 30 h.p. at 2,500 r.p.m.

The crank-case is of heat-treated magnesium alloy and the pistons are a permanent-mold, heat-treated aluminum alloy. The compensating parts are design duplicates of the famous Maybach Motors which carried the Graf Zeppelin around the world in eleven days.

All bearings are either ball or roller type, assuring faultless performance and long life. The cylinder heads are heat-treated aluminum alloy and the crank-shaft, camshaft and connecting rods are constructed of the nitralloy steel. The oil is contained in the lower crank-case and is circulated by the force feed system.

The engine consumes approximately two gallons of gasoline an hour, which



The Aeronca E-107 A engine.

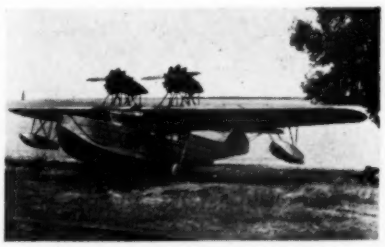
at cruising speed, means about 35 miles to the gallon. In operation it sounds like a multicylindered radial.

Its weight complete is 114 lbs., and is priced at $650 complete with carburetor and magneto.

New Model All-Metal Amphibian Approved

THE first approved Type Certificate to be granted an all-metal amphibian has been issued for the new Towle TA-3, made by the Towle Aircraft Co., Inc., Detroit.

In the department of commerce tests the plane took off from the water fully loaded against a four mile an hour



The Towle TA-3 amphibian with its wheels down. Two Packard Diesel engines are standard equipment.

wind in 18 seconds. With the same load the plane took off from land in 12 seconds, attained a top speed of 125 miles per hour and cruised easily at 100 miles per hour.

As a full cantilever high wing monoplane the Towle offers the well-known advantages of minimum rigging and great cleanliness and beauty of appearance. Two tractor motors are mounted well above the wing so that there is no possibility of water reaching the propellers.

The high bow and deep concave V bottom, having a more decided flare at the sponson, gives the plane its remarkable performance on water. The flare in addition to its cushioning effect throws the spray to the side. The hull is divided into five watertight compartments each having longitudinal and transverse bracings to give extra rigidity.

Extra large movable windows of shatter-proof glass have been installed in the pilot's cockpit. The pilot house may be entered through the cabin or through overhead hinged doors. This allows standing room and quick access to the forward deck without fear of touching the propellers.

The tail surfaces include three rudders, three fins, a single elevator and a stabilizer which is adjustable in flight. These give ample control under all conditions including flight on one motor.

The retractable landing gear is made of steel tubing the lower strut telescoping into the upper which is connected to the wing through shock cord. The wheels are locked in the up or down position by a nickel steel pin, which is so mounted that it is in full view of the pilot at all times. The mechanism for raising and lowering the gear is operated through cables connected to a hand crank located above and behind the pilot and mechanic's seat.

Two Packard Diesel engines of 225 H. P. each are used as standard equipment on this plane, optional equipment being either Wasp Juniors or Wright J-6 300s.

Specifications

Span	56 ft.
Chord at root	112 ins.
Fuel capacity	90 gals.
Top speed	125 m.p.h.
Landing speed	65 m.p.h.
Length overall	42 ft.
Rate of climb	800 ft. per min.
Service ceiling	12,000 ft.

The Human Flying Machine

AFTER twenty years of experimentation, W. M. Herman, of San Jose, Cal., has invented a motorless plane which is an arm-powered contrivance. The plane is constructed along the principles of a glider with the exception that the wings flap vertically.

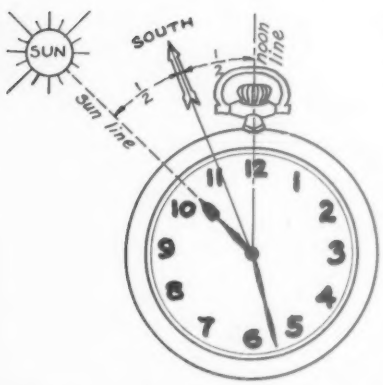
The power of the plane is furnished by the wind and the energetic use of the pilot's arms. The pilot enters the framework below the wings and rests the trunk of his body on a specially constructed seat. Standing in a rather declining position, the pilot bears the weight of the plane on his shoulders and legs.

There are two levers connected to each side of the wing which the pilot holds with his hands, his arms extended straight out from the sides of his body. The pilot wears a cap which is attached by wires to the elevation plane in the rear, enabling him to either raise or lower the elevation plane by nodding his head backward or forward.

In order to raise the plane off the ground the pilot stands on a trailer and is drawn against the wind. The wings which are loosely fastened to the framework, are pulled upward on their hinges, the pilot pulling the two levers towards him, releasing the wind-filled wings and lowering them. Each time the wings fill with wind the operation is repeated. When the wings are filled with wind and are pulled down the plane is supposed to rise. There isn't any rudder on the tail.

The invention weighs about fifty-six pounds and has a wing spread of thirty-six feet. The framework is constructed entirely of wood with wire braces, and the wings are of light canvass.

Use Your Watch as a Compass



YOUR watch is a versatile instrument. It can either tell you the time of day or else can be used as a compass to guide you on your travels.

When the compass goes dead, or when we are provided with no compass at all, we can turn to our watch with the perfect assurance that we can locate true north and south with great accuracy. In fact with greater accuracy in many cases than is possible with the ordinary type of magnetic compass for the watch is not affected by magnetic bodies or disturbances in the vicinity that ordinarily lead to error with a magnetic compass.

The only special requirement in the use of a watch as a compass is that it be used north of the equator (for the system shown), and that the watch be set with fair accuracy to the proper sun time for that particular longitude. As the whole process is dependent upon the fact that the sun is located at a given position at each hour of the day, it is evident that the watch must be set properly in accordance with standard time at that point.

If our watch, for example, is set to Eastern standard time, it will not give the proper indication in Chicago or San Francisco which are set respectively at Central and Western standard time.

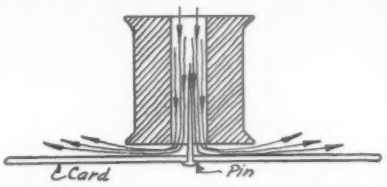
This method of using a watch as a compass is illustrated in the accompanying diagram. The hour hand of the watch is pointed toward the sun as shown, whereupon we find that the true SOUTH is located exactly halfway between the line of the hour hand or "sun line," and a line passing through the numeral "XII" called the "noon-line." This is invariable for any time of the day, whether in the morning or afternoon, for the halfway arrow points to the true south under all conditions so long as the sun can be seen.

If we count the number of minute marks or divisions between the hour hand and the "XII" mark, and then divide the number by two, this midway point will be easier to find and the reading will be correspondingly more accurate. This is at once simple and positive.

Now, it is important to note that these readings give the "true south" at any point in the northern hemisphere when the watch is properly set. Your magnetic compass, on the other hand, points only to the "magnetic north" or south which in many localities is con-

(*Continued on page* 53)

A Principle of Air Flow



A SIMPLE experiment will be sufficient to demonstrate a principle which might otherwise escape the notice of the aerodynamics student. The experiment indicates why a reduced pressure and resultant lift is created by the air flow over the top of an airplane wing.

All that is necessary to make this demonstration is a pin, a card, and a spool. Insert the pin in the center of the card and lay it on the spool with the pin in the hole. Now throw the head back, and attempt to blow the card off the spool by blowing through the hole.

To carry the experiment further, place the card under the spool as shown in the accompanying sketch, and with a finger hold the card against the spool until you begin to blow through the hole. Then release the finger, and you will find that the harder you blow, the closer the card will cling to the bottom of the spool.

The solution of the problem is explained by what is known as Bernoulli's principle; which is, the pressure of a fluid (air is a fluid) diminishes as the velocity increases. Applied as here demonstrated, the air in its passage between the end of the spool and the card, is so rapid that its pressure against the card is less than the normal atmospheric pressure on the opposite side of the card.

Riveting an Airship

AT LEAST six and one-half million rivets are going into the construction of the airship Akron, the first of two giant fortresses of the air being built at Akron, Ohio, for the United States Navy. An outstanding feature in the driving of these millions of rivets into the duraluminum framework of the ship is that it is a practically noiseless operation.

The airship Akron, when completed and stood on end, would approximate an 80-story office building. The din that would attend the driving of rivets into the structural steel of an 80-story skyscraper would be an extremely noisy building operation, but driving rivets into the skeleton of the Akron is different.

Aluminum alloy riveting is done by a squeezing process. The rivets are squeezed into place by hand, not pounded. The squeezing devices resemble nut-crackers with handles about 18 inches long. The ends of the heat-treated rivets are compressed. One rivet at a time is squeezed, and one squeeze to a rivet is sufficient.

(*Continued on page* 57)

Practical Lessons in Flying

By JOHN B. RATHBUN

Take-Offs

"NOW young man," said the pilot instructor Ed Keith, "you have arrived at the point where I think it will be safe to let you take her off, jump her off the weeds or whatever else you wish to call it. If you get away with this take-off stuff in the right spirit, then we will follow up the exercises with landing practice.

"You have done fine so far in the air, and if you wish to sustain your reputation—take special pains on this job—both for your sake and mine."

Bob glowed with pleasure, for this admission on the part of Ed had more kick in it than receiving a Congressional Medal of Honor. Bob had really tried to learn, had been obedient to Ed's instructions, and had shown the proper discipline so necessary in flight instruction. And now he was going up another notch that was soon to lead to his first solo flight!

"All takeoffs can be classified under two groups—good or rotten," continued Ed, "and there is no middle point. And also paste this in your hat—there have been more accidents in takeoffs perhaps than in any other maneuver because the ship is so close to the ground and because there are unexcelled opportunities for stalling the ship by attempting to climb too rapidly. A good snappy takeoff and a good landing are works of art and don't you forget it."

"If we had an army pursuit ship with about a million horsepower available, we could hop right off the grass and walk right up to the clouds without batting an eye-lash, but unfortunately we have only a trainer with a 90 horsepower 'OX.' We must therefore be careful as to how we squander our little stock of power. We must be careful not to snap her up too quick, but on the contrary, to just let her slowly leak off the ground even though it may take the whole length of the field to do it. All right, snap out of it and come along."

Ed determined to let the Kiwi start at the beginning and do the whole thing from starting the engine to making the takeoff. So it was not long before we found our hero placing the chocks under the wheels to prevent her from rolling while the engine was warming up, giving the ship its preliminary ground inspection and doing other similar chores around the crate that had by this time become almost a second nature to him.

He turned the prop over to fill the cylinders with the gasoline-air mixture, walked back and turned the ignition switch to the "ON" position. He then flipped the prop back against compression and away she started.

Slowly at first until partly warmed up and then faster and faster until the engine showed evidence of reaching the desired temperature by its smooth, steady running and uniform exhaust note.

"NOW take your time and get her warmed up as you never warmed her before," ordered Ed, "we will need all the heat that's in her jackets for this first job of yours. If the engine should poop-out just after the takeoff, you will be busy picking miscellaneous airplane fittings out of your system for a month, providing nothing worse happens. And another thing, just practice snapping and unsnapping your safety belt so that you can get free from the belt and the ship pronto in case of a crash.

"You will see now why I have given you so much taxi and grass-cutting practice. It gave you confidence and control of the ship on the ground so that you are in a much better condition to take off than you would have been without this rolling practice.

"Where ever possible run straight into the wind during a takeoff as I have repeatedly instructed you before, and this will be absolutely necessary on your first takeoff. If you look at the wind-sock on top of the hangar you will see that the wind is straight from the west and that it is coming steadily. This means of course that we will have to turn the ship around and run directly toward the west. It is quite fortunate in this case because this is in the direction of the length of the field, giving us plenty of space for the run before we slap our faces against the west fence.

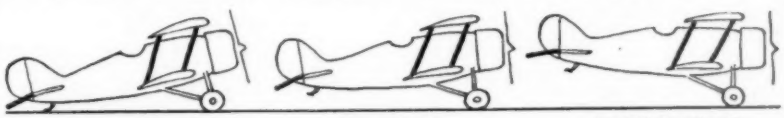
"Just before you start, look all around you and up and down to make sure that there will be no danger of collision with other ships, and especially ships that are making a landing. The law gives a landing ship the right of way over everything that moves, hence be careful to avoid a ship that seems to be attempting a landing.

"Now just another remark on starting against the wind. If you run against the wind at a speed of 40 M.P.H. and the speed of the wind is 15 M.P.H., then the air speed over the wings is the sum of these two speeds, or there is a total lifting effect of 55 M.P.H.

"If there is a dead calm, then the air speed will only be equal to the ground speed of the ship, while if you run with the wind 'on your tail,' the air speed will be the difference of the two speeds or only 25 M.P.H., and in the latter case the wind pressure will not be sufficient to lift the ship off the ground. If this repeated instruction on wind speed is getting tiresome to you, pray accept my apologies, but it is so darn important at this point that I am not taking any chances on your memory."

Bob smiled, for he had had this speed dope drilled into him at the ground school and then Ed had repeated it about three times every day since that time, but he fully understood the importance of the matter and raised no protest against this endless refrain.

He understood perfectly that just so much speed is required to lift the weight of the ship, and if there was not a sufficient supply of air over the wings at this speed, then the ship would remain firmly planted on earth.



(A) On Ground (B) Tail Off (C) Gaining Speed

Fig. 1.

ED HAD sketched three little diagrams on the cement runway of which the three positions in Fig. 1 are a copy. This shows the first stage of taking off, which has speed as its final objective. After we gain the necessary speed, then will come the second series of three operations in making the take-off. Altogether, there are six separate positions in the takeoff, as shown, and the position of the elevator flippers should be carefully noted in the sketches.

"Now look at the first picture (A)," said Ed. "This shows the ship in its safest attitude—that is, setting on the ground ready for the start. We now give her the 'gun' by opening the throttle and away we roll down the field with the flippers turned way down until the tail lifts as in (B). This tail lift should take place as soon as possible to avoid the racking strains set up by dragging the tail over the ground at high speed.

"After a little more running, the speed is sufficient to bring the tail up so that the centerline of the ship is in a horizontal position or in its normal flight attitude, as in (C). This gives the least air resistance and we then continue running in this position until we attain sufficient speed for the take-off.

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"Now let me say right here that it does not pay to attempt taking off before you have plenty of speed. If your attempt comes too soon, she will not only refuse to lift, but you will also kill a lot of the speed by adding wing resistance. Don't be afraid to get her rolling free and fast, and, for the love of Mike, hold her horizontally—neither too high nor too low—to avoid a whole lot of grief.

"More Kiwis get into trouble here than at any other point in their training, and I wish that you would be one of the few to have the distinction of getting off properly the first time.

"When we get up to speed, the next thing is to get her off the ground, and this means that the angle of incidence made by the wings must be increased by slightly dropping the tail as at (D) in Fig. 2. We have the speed now, and the only element lacking is a little more incidence, which is had by dropping the tail as indicated. This is a rather delicate performance, and go at it slowly. Don't try to jerk her off suddenly or you are certain to stall the ship. Just a nice, easy, slight backward pull on the stick and she will hop off.

"As the wings take up the load, the bumping and thumping will gradually die away, stopping altogether when the ship leaves the ground. You will also notice, as you probably have already noticed, that the engine exhaust takes on a new sound, which alone is a signal of the takeoff. When in the air, the pull of the ship is reduced and the speed increases so that the engine revs are a sure indication that she is hanging on the air.

"Just after we are off, the next thing is to get some more air speed before we attempt any further climbing, so that we level her off nicely as at (E), so that the elevation only slightly increases, if any. In this position, the speed increases rapidly with the open throttle, until our judgment tells us that we have enough speed for the climb.

"To climb, we pull slightly back on the stick so that the tail drops as at (F), always avoiding a sudden or excessive movement of the controls. Climb as slowly as you can at this stage to avoid a stall and crash, and, above all things, don't try to make a turn in this position, for turning kills your speed and is a cause of frequent disasters. Speed—that is the thing."

Fig. 2.

(D) Off the Ground (E) More Flying Speed (F) Climbing

"WELL, now, let's hop to it," ordered the pilot. "We have had the theory of taking off—now we will try it. Get into your coop and keep your head. Don't forget to treat the stick gently and with respect, and still further, don't try to get all of your altitude in a bunch."

Bob opened her up with a roar, and swung her around into the west wind after a short run, and then opened her up further for the takeoff. With the stick well back, he could feel the tail coming up, and then, when his sense of horizontal told him that she was in the position of (C), he slightly relaxed the stick to prevent further raising of the tail.

They now gained speed rapidly, and at a snort from Ed through the phones, Bob pulled just a trifle back on the stick so as to increase the wing incidence. Almost immediately the bumping grew softer and softer until Ed shouted "off" through the phones. They were now in the position (D), the most precarious position of any.

"All right, all right; raise her tail and let's get a little more speed. Level her off for a bit until she gets to zipping along like she should before we start climbing. Left-rudder quick, she's swerving. That's it; don't forget you have a rudder in all this excitement. It would be darn embarrassing to be swiped in the face with her tail. Attababy, let her have it."

They sailed along at a good clip for some little distance along a line parallel to the earth, Bob using the rudder and ailerons in addition to the elevator for keeping the ship on an even keel. Not bad for a beginner—not so bad.

In the majority of cases, the student is so intent upon raising and lowering the tail in taking off that he overlooks the other controls—often with disastrous results. Owing to turbulent currents so close to the ground, there is even more demand for the corrective effects of the rudder and ailerons than at higher altitudes in full flight.

"Now let's go up," said Ed. "Just a little back on the stick until we get up to about 1,000 feet. Take it easy, take your time, we have no dinner engagements and no trains to catch. Hey, get her nose down a bit, you're feeding it to her too fast—hear that engine."

The engine was groaning under the load, and Bob relaxed the stick slightly into the forward position to reduce the labor. He glanced at the altimeter and saw that it now registered 800 feet—not bad for this length of time. At 1,000 feet the stick went forward until her nose was again on the horizon in normal horizontal flight.

Bob then highballed the pilot for further instructions and got them quickly.

"Give me the stick and I will land her so that you can try another takeoff. That one was fine—congratulations."

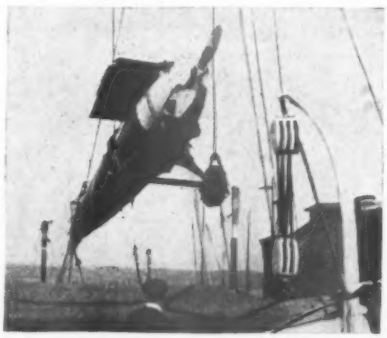
German Plane Has Motors Built In Wings

THIS new German type of plane, constructed at Bremen, is expected to become popular for short traffic hauls through the air. The machine is compactly built and is run by two motors built in the wings. The manufacturers claim that one motor can be stopped while the plane is in the air without impeding the flight.

Question Mark Gets Easy Ride Home

THE plane "Question Mark" had to work its way from Paris to New York, but received a reward of a comfortable ride back home.

The trans-Atlantic plane which served Major Coste and Lieutenant Bellonte so well on their epochal flight is shown being hoisted aboard the French



Line steamer France. The sturdy ship was carried back to further honors and the admiring gaze of French enthusiasts.

New Ruling for Airplane Prospects

ACCORDING to the new Department of Commerce policy, it is now permissible for unlicensed prospects to "take the stick" on demonstration flights.

Transport pilots may demonstrate the flying characteristics of approved aircraft to prospective purchasers by permitting their prospects to handle the controls while in flight.

This policy also applies to flying instructors who wish to turn over the controls to prospective flying students.

Among other limitations, the demonstration flight must be given to the prospective purchaser or student without charge.

Air Corps Officer Juggles With New Problem

BACK in 1921 Captain H, well known Air Corps officer, commanded an Air Corps organization on the side of Diamond Head, Hawaiian Islands. The outfit was in tents and a temporary wooden structure was used as a mess hall. Dut to the number of cracks and holes in the building, it was impossible to keep flies out.

The department inspector on his annual inspection noted this, and in his letter setting forth the irregularities and discrepancies noted, he stated under paragraph 1*c* "Too many flies in the kitchen." It was necessary for Captain H. to answer this letter, replying as to what corrective measures he had taken on these irregularities and discrepancies.

Coming to this paragraph, he growled and said: "What does he mean *Too many flies* in the kitchen; are we supposed to have any? I'll answer a quick one on that one."

Sitting down he answered paragraph 1*c* as follows: "Information is requested as to how many flies are allotted to a company of one hundred men."

The inspector was hot, but realized that he had worded his phrase poorly. Not to be outdone by a youngster, he came back with this fast one.

"In regard to your request in paragraph 1*c*, this information is not available at this time. However, G-4 is working on it and shortly a bulletin will be issued setting forth the table of allowances."

A World Record Long Distance Camera

THIS picture will give you a clear idea of the size of a long distance aerial camera.

Mr. Fairchild (left) and Mr. Goddard of the Photographic Section at McCook Field are seen examining Fairchild long range camera. This camera was used by Captain A. W. Stevens when he took the world's highest photograph from over six miles altitude.

WHAT YOUR HANDWRITING REVEALS
by
DR. M. N. BUNKER

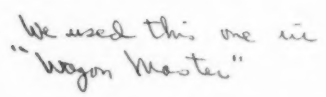
A YOUNG man who has just seen one of the great air pictures has sent in a page of his writing and asked this question: "Do you suppose if I learn to be a good flyer, I can get into the movies? That is, I mean does skill with a plane really amount to anything in the movie world, or do the actors have doubles who do the real flying?"

And almost in the same mail there is a letter from a man who has just bought a plane. He wants to know if he has "the natural ability to be a success as an aviator?"

These letters are typical of a national condition—of a nation gone air-minded. As an example a busy man who knows nothing of machinery—who does not have any inclination to handle a ship, said to me recently, "I'm going to buy a plane, because I think it will be a saving of time; that is, I am if you think I have nerve enough to take to the air. I can save hours of valuable time if you think I have the right sort of stuff in me to learn to fly."

These men and women are not writing such letters just for fun; they really want to know if they have the natural ability, the type of natures to "take off" and stay in the air in good weather and foul without losing their heads. The man who holds down a difficult air job does not rush into things; he does not lose his head.

There is proof of this in the handwriting of Ken Maynard of "Fighting Legion," "The Wagon Master" and other pictures. Maynard is an outdoor



man who found the change from horses to planes an easy one. Now he is a licensed pilot, and flies his own plane.

This bit of writing of his says that he thinks like lightning, but that he keeps his head. He possesses cool reserve, the natural ability for self-adjustment, with absolutely nothing of the hysterical or high-strung about him.

Maynard can talk easily, has just a trifle of a temper, is a real diplomat when it comes to handling people, and knows when to keep still.

Through everything, though, he keeps a cool mental balance that keeps him from doing anything reckless.

This bit of writing shows natural skill in the use of his hands, which properly trained means some engineering ability.

OUR next specimen is that of Charles "Buddy" Rogers, whose screen success has been one of the most startling in the movie world. A few years ago young Rogers was in eastern Kansas with a little orchestra, and now it is only a matter of months since he starred in an air picture that took the

country by storm. He had to have natural ability to do this. There was something woven into the nature of the country boy to give him the ability to make such a jump to fame and actual air-success.

Here is what his signature says: He has self-reliance. He is not afraid to try. He does not get excited easily. He does not turn and run when the battle turns against him. He has poise; he thinks very rapidly, and there is the same skill in the use of his hands that we have found in Maynard's writing.

Of such stuff are movie air-men made, and as their real natures are revealed in their writing.

Such evidence is reliable. It checks with the lives the men lead, just as such an analysis proves the character of Lieutenant Hinton, whose signature

is printed this month.

This shows very great loyalty to what is right. It shows distinct engineering talent, and very decided inclination to keep personal matters to himself. Lieutenant Hinton builds air castles, but he does not become highly enthusiastic about them. Instead he considers when and how they can be accomplished. He uses cool judgment, and anything that he undertakes has his whole attention.

Men and women with such characters make aviators. They have the stuff to stand the strain of emergencies, just as you may have qualities that would make you a success in the air, or in engineering, or in law, or medicine, or in managing a farm or business.

POPULAR AVIATION *has arranged with Dr. Bunker to make an individual handwriting report for each reader who will write him. Enclose a stamped and addressed envelope, and ten cents in silver or stamps to cover the actual clerical cost of making the test report. Address your letter to Dr. M. N. Bunker, Reliance Bldg., Kansas City, Mo.*

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MODEL DEPARTMENT

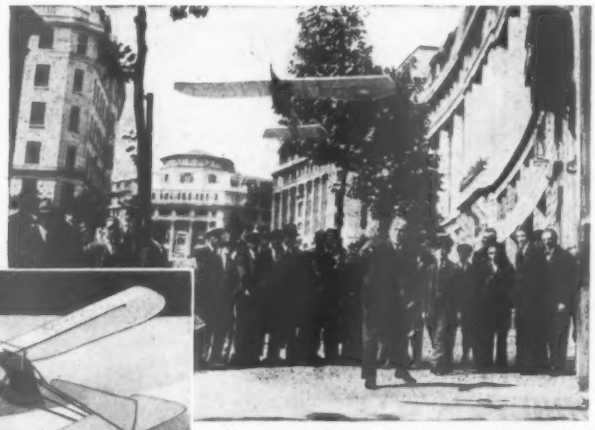
How to Build the "RIGBY RANGER"

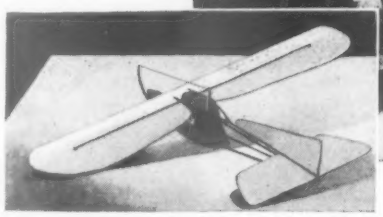
A five-foot sailplane

by

W. RIGBY

Famous English Model Designer





Above, Mr. Rigby is shown hand launching the "Rigby Ranger" before an interested London audience. Left, a sketch of the completed model.

IN RESPONSE to a great number of requests, we are dealing, this month, with a design for constructing a new and practical type of model sailplane or glider.

A glance at the photograph will show how attractive this model will be when built, and its performance is even better than its lines, being practically unbreakable with reasonable handling, and having its main proportions worked out in a way that makes for stability in flight.

The model will make quite a good glide from a hand launch at arm's length, so buoyant is it in flight, landing very gently and quite steadily on its leaden skid. The ideal method of flying this sailplane, however, is in a field or meadow, with a slight wind.

The model should be attached to a ball of strong thin twine at the point where the underskid spar meets the bottom fuselage spar, and, after having paid out some fifty yards of twine, a run against wind will take the glider up in a similar manner to a kite, when manipulation and the paying out of more twine will keep it up for lengthy periods.

Another way of flying this model is by inserting an "L"-shaped hook where the twine is attached in the previous method of flying. This hook should be about 1½ inches long and run parallel with the fuselage strut. The end of the twine should be made into a fairly long loop (about 1½ in.) and slipped onto the hook. Then when the model has been kited to a good height, say, between 100 and 200 ft., the action of stopping running will slip the twine off the hook, leaving the sailplane to its own devices.

In kiting up to the necessary height the model should be watched carefully, so that should it bank either to right or left it can be brought to a level keel by running in the opposite direction to the bank.

The following materials are necessary for construction: stiff glue, penknife, pliers, good scissors, two yards of Jap silk, four safety pins, ¾ in. household tape, 5 oz. sheet lead, parcel tape, short length of ⅛ in. wire, and a little twine.

Also, some good quality cardboard of a "tangy" nature for the center fuselage sections, wing and tailplane tips; a quantity of stripwood, including at least two full 4-ft. lengths of approximately ⅜ in. to ⅛ in., which will be used in the wing, one at front edge and the other upright along the entire length in the slots indicated in plan; and finally a length of ½ in. by ⅛ in. of good quality straight grained wood from which the underskid will be fashioned.

The main measurements are marked on plan, the wing span (5 ft.) being sufficient to arrive at the full length of each side of a plan of wing, allowing for the cardboard tips.

FIRST cut out six wing ribs to size shown. Extreme care must be taken in this, owing to the fact that before being brought into use these ribs will have two very weak spots, the first at the deep upright slot at the top, and the second, the thin taper to rear end. When, however, these ribs are successfully fixed into place, their united strength need give no cause for misgivings.

Having cut all wing spars to length, proceed to assemble by temporarily parcel-taping the ribs into place, afterwards passing lengths of glue-soaked ¾ in. household tape completely round the finished wing rib sections. Next cut the two wing tips as accurately as possible to plan and fix *all* lateral spars to *underside* of each cardboard tip, tapering off the two ends of the main upright spar so that they will not show in upward sweep of wing tips when complete.

Do not taper these too far down, however; otherwise their outward supporting properties may be lessened. All spars may be fixed to tips with parcel tape, as when covering the model the fabric will be firmly fixed to the tips all over, thus securing the entire wing tip area top and underside. Lash a safety pin loop at each wing tip where shown, to accommodate bracing beams.

Tailplane is a simple structure consisting of three single lengths of ¼ in. stripwood fixed at cardboard tips with parcel tape and the whole double surfaced with fabric, joining seam at rear and seeing that surface does not warp in setting.

The complete rudder fin may be made of cardboard in the manner shown, as this is never in a position to be damaged. It should be doped with any suitable color dope to disguise its cardboard appearance. The fin has a short length of stripwood glued firmly on each side at the position shown, and between these at the top a small safety-pin loop is wedged and glued; this will be used later to rig the tail.

At the bottom a length of heavy safety-pin wire is driven up into the cardboard; this serves to hold middle of front spar of tail plane in place, a small hole being pierced in that spar to receive the wire. The area round the hole, to a distance of one inch on either side, is clipped by a piece of tin folded double over the spar, a corresponding hole being pierced in the tin.

THE fuselage can now be commenced. First, cut the three cardboard sections to sizes given on plan, one of these sections being cut down to level of top of main tail spars—see dotted lines. Next, cut fuselage spars to measurements given and assemble on to sections, freely using stiff glue to insure that these spars are well and firmly embedded in their respective grooves, finally guaranteeing the whole structure from bursting away when bent by passing well-glued household tape around the three sections, allowing the whole to set firmly before proceeding further with the fuselage.

Now bring the four front and four rear spar-ends forming fuselage together and fix firmly, using glue-soaked twine and taking care that all spars are warping evenly before allowing the

two ends thus formed to set. The front should have a small upright piece of stripwood inserted as shown in the plan, but the rear ends should be drawn right together, forming a point. The natural warping of the four front spars should form a very graceful line to the fuselage.

Join the two top fuselage spars at two points shown, seeing that these lie central, next join the central, but main, pair of tail spars in a similar fashion, and finally warp up the bottom fuselage spar and join it to the two pairs of tail spars, allowing only an extremely narrow slit to exist between the two pairs of tail spars (through which the tail plane is passed) and securely bind the extreme tail end of fuselage with glue-soaked twine to a distance of nearly half an inch, introducing a safey-pin loop as shown on diagram.

Having warped by steaming or other method about four inches of the front of the underskid timber, glue the top side of same freely and attach it to the underside of the fuselage spar, commencing from the tail and binding it at three or four points. This will have the effect of both strengthening the whole tail area and giving a protective and springy underskid to the whole machine, particularly when, after binding a safety-pin loop on the top of front of skid, a piece of stout elastic is passed over the central upright spar at rear of fuselage.

This latter spar is glued to back section of the fuselage and reinforced by a piece of stout wire as shown, the

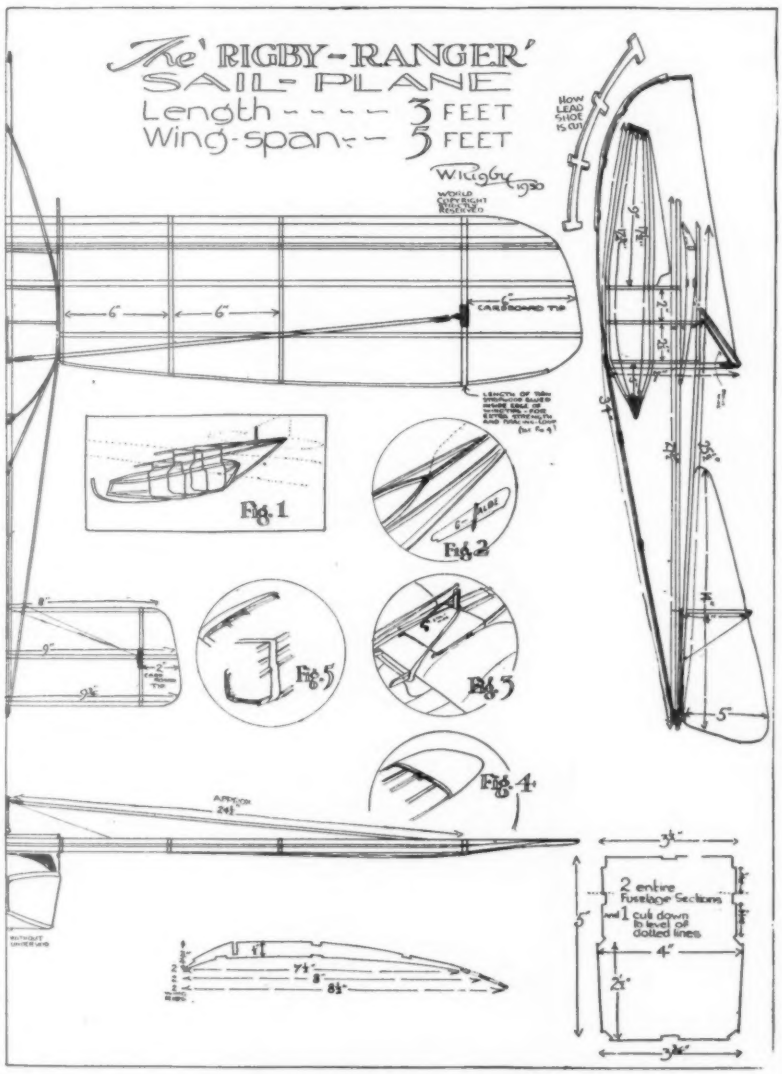


Fig. 1. Disposition of fuselage sections, showing lay of beams to whole.
Fig. 2. How top lateral spars are drawn together, forming a twin support for rudder fin, which is passed in between to extent of small bottom flange.
Fig. 3. How wing is maintained in position by elastic band; this has the effect of lessening wing-jar when landing.
Fig. 4. How cardboard tips are put into place. Note particularly the slight camber they should receive, following camber of wing ribs, but in a much lesser degree.
Fig. 5. How good household tape is brought into use. This, if securely glued, has the effect of holding all main structure securely and is the greatest strengthening feature of the whole plan.

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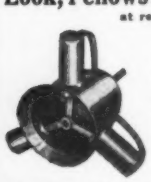

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front of which is formed into a spur and the spare end being passed down through the roof at back of middle fuselage section.

The wing is inserted into the slot on front roof of fuselage and a stout elastic band passed over it from rear of upright post, down over two protruding front ends of plane supports (Fig. 3).

The tail plane is positioned between the two sets of fuselage spars and fixed there by rudder fin which wedges between the twin top spars, the bottom of the rudder post with wire point being passed through the hole pierced in tail plane front spar.

The whole structure is then rigged with twine in such a way as to slightly lift tips of tail plane and firmly fix whole in a non-swaying manner, tying the ends of twine into safety-pin loop at back of tail spar lashing.

The two wing bracing beams are made from narrow gauge motor beam or similar wood (cane is an excellent substitute) with a wire hook lashed into either end. The hooks fix into wings at loop on edge of cardboard tips, and meet at the top of the center upright at rear of fuselage. These beams serve the two useful purposes of bracing when landing and holding the wing tips down when in flight.

The lead shoe, weighing approximately five ounces (experiment for this), must now be cut and fixed as shown; the model is then finished.

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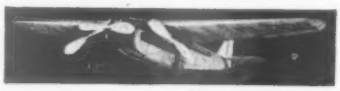

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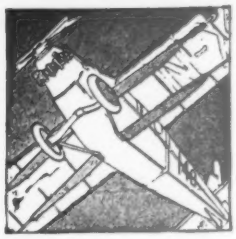

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EDITED BY **LOUISE THADEN**

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Louise Thaden

We all know what fine flying Miss Hopkins did in both competitive events, particularly in the highly professionalized one of the Ford Tour, so we'll jump along to more personal things most of us don't know about.

Of course, one must always arrive in this world at some time or other, and Nancy picked May 16th, 1909 for this auspicious occasion—Washington, D. C., was the place. She says that she was always interested in flying and would have started long before January, 1928, had she known how simple the requirements were.

Instructions started at Hoover Field, Washington, D. C., on a Waco. After flying about in Eaglerocks and Travel Airs for a while, the Department of Commerce gave her the much worked for private pilot's license. Last year Nancy migrated to Roosevelt Field, N. Y., and built up for her Limited Commercial license on Fleets.

As this is written, the log book shows 252 hours solo flying, with a Transport examination in the offing. Having gone through six forced landings in her rather short career as a pilot, we feel sure a little thing like a Transport test will be all in the day's work for Nancy.

* * *

Opal Kunz has written an interesting article for the "Guidon," published by the Women's National Republican Club, on "Girls are learning to fly." Opal, by the way, has been winning quite a number of local races of late. She has a Wright 300 Travel Air biplane.

* * *

Blanche Noyes of Cleveland has a brand new house, so flying has sort of gone by the board the last few months.

* * *

Ruth Nichols and Eleanor Smith enjoyed the pleasure of opening the new southern mail and passenger route, flying to California and return to Atlanta.

* * *

Miss Joan Diehl, debutante of Pittsburgh, Pa., has successfully passed her test for private pilot's license.

* * *

Jean LaRene of Kansas City is busily flying about selling and demonstrating American Eagles.

* * *

It is regrettable that Laura Ingalls' coast-to-coast record for women was so short lived, but we congratulate Mrs. Miller upon lowering the time for the crossing. Mrs. Miller has several more records in mind, one of which is to fly from Pittsburgh, Pa., to Cuba. She is using an Eaglerock Bullet. At the same time, we can't help wondering what record Laura Ingalls will go after next—whatever it is, we wish her luck.

* * *

Some gentleman from Hawaii wrote in and sent a newspaper clipping showing the entrants in the West Coast derby this year, wanting to know who the second girl from the left was ——, it happened to be Jean LaRene. Be on the lookout for some fan mail, Jean.

* * *

I have just returned from flying in Eastern Canada. Believe me, conditions up there are quite different from ours down here—even ship requirements are not the same. There are only two or three months of the year when planes are on wheels, skiis being used a good deal of the time, and pontoons, since every lake and river (of which there are an abundance) offers a natural landing field. Every pilot must be an expert woodsman and huntsman—otherwise—.

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Watch Compass

(*Continued from page* 44)

siderably displaced from the true north as shown on maps.

Unfortunately, the magnetic deflection of a compass varies from point to point on the earth's surface, so that while it may point to the magnetic pole at one position, it will be many degrees off in another locality, hence the necessity of a magnetic chart for making corrections to the readings. Your watch, however, is free from such natural variations and points true south regardless of magnetic influences. For this reason, the watch readings can be used in connection with a map without making corrections.

In effect, this is a miniature and simplified replica of the sextant employed on shipboard, used in marine practice for accurately laying down a ship's course on the ocean. The navigator "shoots the sun" with the sextant, getting the sun's position, and then in combination with the ship's clock which keeps standard time, the position or course can be accurately computed.

In the case of the watch, the time keeping function of the watch corresponds to the ship's clock while the hour hand of the watch performs the duties of the sextant. This is very useful for the pilot, or in fact, anyone who must steer a course of any sort without visible landmarks for guidance.

Caterpillar Club

(*Continued from page* 29)

feet, and did some vertical banks, wingovers, loops and snap rolls. After finishing these maneuvers, I tried a vertical reversement without success. I then went on up to 3500 feet and started to do a slow roll. Just before getting over on my back, a fitting on the front strut on the leading edge of the right wing gave way, causing the entire wing to collapse. The ship started into a slow flat spin, and I immediately started to jump. In order to get out of the ship, I had to push the wing forward, as it had slid back over the rear cockpit when it collapsed.

"What happened in the next few moments is not clear in my mind. I remember standing up on the seat with one foot and the other foot on top of the wing, then diving over the side. To say I was frightened would be putting it mildly.

"After making two and one-half complete revolutions, end over end, I pulled the rip cord and the chute opened perfectly. I looked up over the edge of the chute, and saw the ship was coming toward me rapidly, and in an endeavor to get away from it, slipped the chute, which proved successful. The falling plane missed me by about fifty feet. I heaved a sigh of relief as the ship went crashing into a grove of trees below. My descent was very slow, and the thing that surprised me most was how quiet everything seemed to be.

"As I floated down, I noticed I was heading for the same grove of trees the ship had crashed into. Again I slipped the chute and succeeded in missing the trees, landing into a small opening without a scratch.

"The last drop to the ground was nothing more than jumping off an object about four or five feet from the ground."

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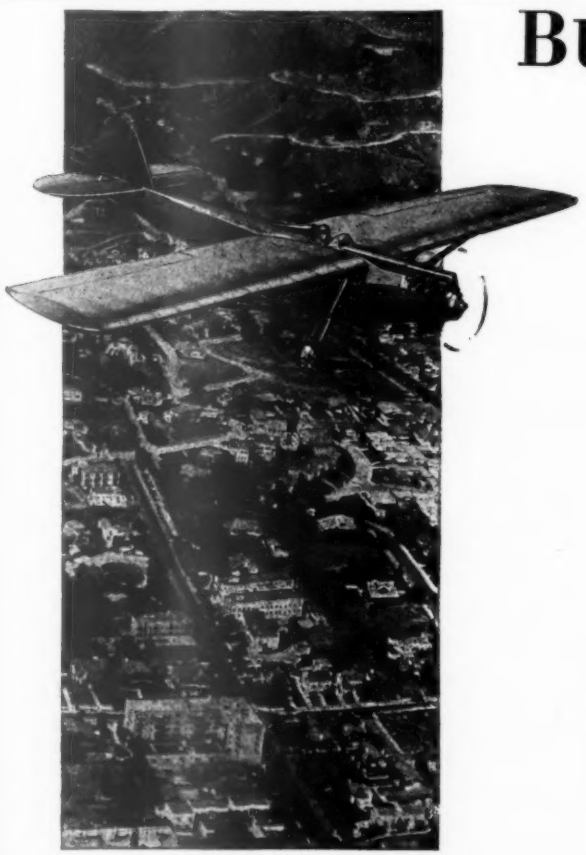

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How to Build the Heath Parasol (*Continued from page* 34)

butt ends of one pair together so that the ends are flush with each other and with a pencil, mark on each spar the exact positions of the ribs as shown on your wing print. Note that the centers of the first six ribs from the butt end are 11" apart and the rest are 12" apart. The marking is done at this time so that when you assemble the ribs on the spars the wing will be square and the butt ends in a straight line.

Drag Wire Terminals

WITH your spars tapered and drilled, you proceed to make your internal drag wire fittings (detail No. 6). Take item V-41, and with a cold chisel upon a flat iron surface cut from it six pieces 3¼" long and six pieces 2¾" long. With a file round the corners. Mark a center point on each of the six long pieces and from that point measure 11/16" each way and mark the centers of two 11/64" holes to be drilled there.

Also 5/8" from each of these marks, and between them and the ends of the piece, mark two more points where 5/32" holes will be drilled. Drill these four holes in each of the six pieces and then put in a vise and with a hammer bend the ends to a 40 degree angle as shown in detail No. 6 on your print.

The six shorter pieces are made with three holes only, two 11/64" and one 5/32". They are like the longer ones except that one end is missing. Be sure that the distance of 1⅜" between bolt hole centers is accurate since you have already bored corresponding hole in your spars.

Two special compression fittings are made from item V-42. These are shown in detail No. 19 in your print, and one belongs on each rear spar at the second compression station from the butt end. This is used because the position of the gas tanks in the wing makes it necessary to use two wires from this point to the butt of the front spar.

Rib Assembly

YOU are now ready to assemble the ribs on the spars. Have some one assist you in this. Arrange the spars so that they are the proper distance apart and have the butt ends against a wall or something solid. From the tapered end slide one regular rib down to a point fifty-five inches from the butt end. Slide another plain rib to a point twelve inches from the first. Slide the ribs over both spars at once.

The next is an aileron compression rib and must be put on with the compression fittings between the spars and the rib struts. You will probably have to cut a little wood from the rib struts to make room for the fitting so that you can slide the rib into place.

When all of the aileron ribs have been put in place slide on the other regular and compression ribs in their proper sequence from the butt end. Now put on the small end rib and glue and nail (V-68) each rib in its place on each spar. Do not fasten the butt rib in place. Line up all the compression fittings and fasten with machine screws (V-64) to the spars (V-40).

Internal Bracing

NOW make your stay braces (drag and antidrag wires). These are made from No. 14 hard wire (V-43). First clamp two 16 penny spikes point up in your vise; these will aid you in making loops at the end of your wires.

File the head on one of the spikes flat on one side so that the spikes, when clamped in the vise, are not more than ⅛" apart. A loop is made by placing a length of wire between the spikes, allowing about 2½" to extend beyond them. This short end is bent around one of the spikes until it points in the direction of the longer end.

The long end is then bent in the opposite direction and a slight reverse curve is put in the wire. The partially formed loop is removed from the spikes and the short end inserted between the spikes and a slight reverse curve is put in the short end close to the original bend like that in the long end.

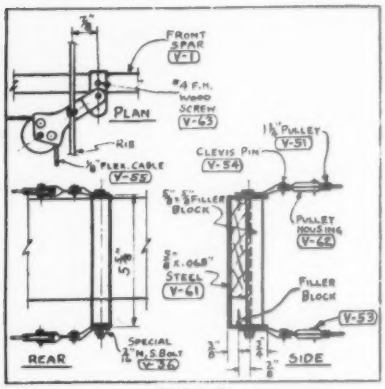
At this time, and before putting a loop at the other end of the wire, put two No. 14 ferrules (V-44) on the wire from the straight end. Make a similar loop at the other end. One end of the wire is hooked into the eyelet of a small turnbuckle (V-37) and the loop is closed by pressing the sides of the wire together and slipping a ferrule down snugly against the loop and bending the short free end back down against the ferrule.

The loop at the other end of the wire is hooked into a drag wire terminal on the spar and the loop closed in the same manner. The slotted end of the turnbuckle is fastened to its proper compression fitting by means of a clevis pin (V-45).

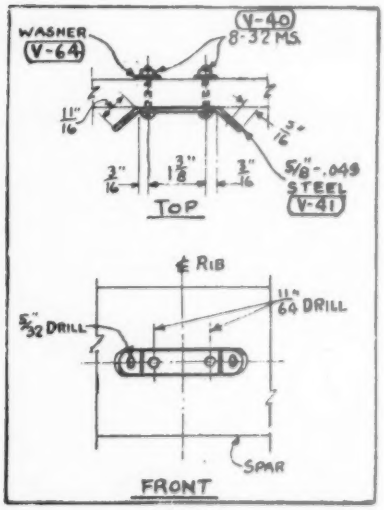
When measuring for these wires it is best to cut a piece some six inches longer than necessary and loop one end attaching a turnbuckle. Then fasten the turnbuckle to its terminal fitting and stretch the other end of the wire to its terminal fitting and mark where the loop is to be made by holding it with your fingers.

Do not nick or break the surface of the wire. Have the turnbuckle extended part way when measuring, so you will have plenty of take up when tightening wires. You will not be able to measure or attach the two wires which run to the butt end of the front spar, for you will not make the spar butt fitting until you reach next

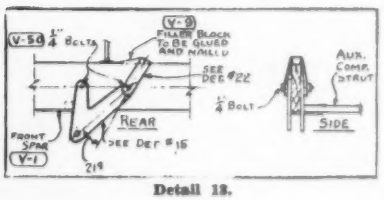
(*Continued on page* 63)



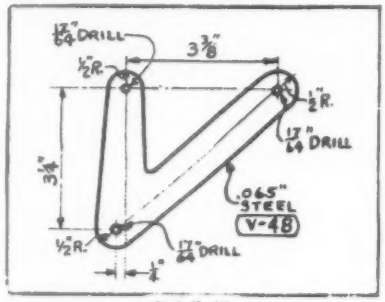
Detail 5.



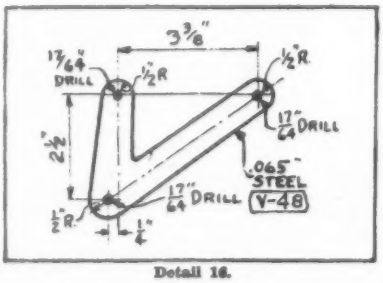
Detail 6.



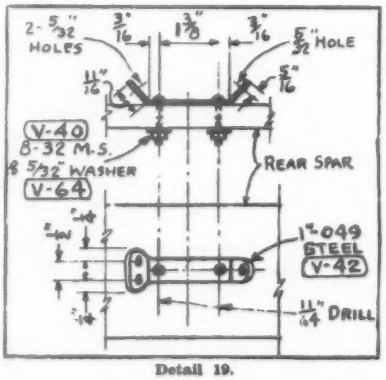
Detail 13.



Detail 15.



Detail 16.



Detail 19.

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WINGS — Two outer and center section, airplane construction internally braced fabric covered. Weight 249 lbs.
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Height Overall....3 ft. 10 in.
Wing Area....216 sq. ft.

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3 WAYS TO OWN IT—You may buy the complete parts knock-down ready to assemble for only $285.00, without motor or motor mount.

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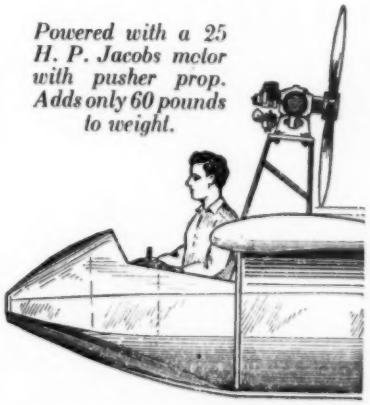
Powered with a 25 H. P. Jacobs motor with pusher prop. Adds only 60 pounds to weight.



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will bring you complete details for building and flying the "Amphib" in a practical hand-book which contains profusely illustrated glider data, wing, fuselage, empennage, aileron construction, plans and charts—flying instructions, power adaptation, ground course, history, types, terrain, etc. Complete with Dept. of Commerce Regulations.

Amphibian Tricks

(*Continued from page* 18)

ing the plane that way. For if a turn is made to the right, the left aileron drops, and it presents more surface to the wind than does the lifted one on the right; therefore, the wind from the rear pushes on the left wing and swings the plane to the right.

Ofttimes it is desired to go much slower in a seaplane or amphibian than the lowest idling speed of the engine will permit. The engine speed can then be decreased—first, by retarding the spark; second, by placing the ignition on just one switch, and third, by cutting the engine entirely for a few seconds, just putting the switch back on when the engine is about to stop, keeping up this intermittent action. By this means the speed of the plane on the water can be controlled almost to zero speed.

When landing cross wind, especially on water, it is of paramount importance to keep down the wing that is into the wind. Thus you are not only slipping into the wind, which decreases your drift across the water, but also when you touch you have less danger of having the wing tip float on the other wing touch. For if that wing tip float should get caught in the water it would swing the plane around, lifting up the windward wing, allowing the wind to get under it, which would probably turn the plane over on its back if the wind was strong.

If the windward wing should catch, it might swing the plane around, but it would head it into the wind, and keep the inside wing from having wind get under it. Of course, it is best to have neither wing tip float touch when landing.

In very rough water with a strong wind blowing it is usually considered best to land directly into the wind, dropping the plane in a few feet in a thorough stall landing. Only if there are huge swells, and a relatively light wind would it be better to land cross wind along the swells. If it is rough, such practice is doubtful, and one should be guided by the circumstances.

It is generally a wise rule always to land into the wind, no matter how the waves are running. On the takeoff it may sometimes, as in the case of big waves going cross wind, be wise to take off along the waves and cross the wind. Yet if the plane can go into the waves without damage, it is best to take off into the wind, and cross the waves that it has kicked up.

In a strong wind, it is sometimes impossible to turn a plane around on water to go down wind. In that case, go backwards down the wind. If the engine is going, just point the engine in the direction toward which you wish the plane to move as it is going backward, and the plane will sail right over even though going backwards.

If the engine has stopped, the tail need but be pointed in a given direction and the plane will go that way. The tail can be pointed by use of the rudder and the ailerons. Thus, with a dead engine, a pilot can direct the sailing of his seaplane or amphibian over an angle of more than ninety degrees.

Such facts as these are of great importance to a pilot in an emergency, and no less valuable in ordinary flying. By heeding and observing just such simple rules as these for the water handling of planes, much damage to seaplanes and amphibians can be prevented.

Spotting Mines

(*Continued from page* 38)

Balloons were transferred from ship to shore at the R. A. F. base by being pulled over while in the air by a ground crew, since it was much easier for a group of men to handle them that way than to deflate them and carry them on or off the ships.

I ONCE witnessed a stirring sea battle between a shark and a sword fish which, when viewed from the air, provided a thrilling spectacle.

I could not tell who won, because after a short while the sea became covered with blood, but it seemed to me that the shark was being badly beaten while I could see it.

It was also quite possible, when over shallow waters, to look down and see sunken wrecks, many of which were sunk during the war and some of which probably were sunk hundreds of years ago. History goes far back in this Ægean Sea and many famous battles have taken place there.

During my experiences with kite balloons over the Ægean Sea I was in one accident which came after a strenuous day's work as we were proceeding in tow back to our base.

At the time there were three of us in the basket off Dedegatch, a town on the Bulgarian Coast. Our bag was heavy, as one could tell from the angle at which it hung in the air. It had been up all day and the weather was extremely hot. There had been a bit of a breeze blowing and at times the balloon rolled a bit after its natural reaction to the wind.

Suddenly, without any warning, the balloon was caught in an air pocket and dove down into the sea from an altitude of about 1,000 feet, falling in zig-zag fashion in a diagonal course.

The crash was so great that the teak wood boards that formed the floor of the basket were snapped in two. Fortunately all three of us escaped with our lives and the only injuries were suffered by my two fellow officers, who both received broken legs, probably as a result of the breaking of the floor boards.

For my part, I was badly shaken up but was uninjured. Rescue was quick to reach us from the ship which had but a moment before been towing us through the air.

It is difficult to imagine what might have happened if the Ægean had been swept without the valuable assistance rendered by the balloons. As it was, we lost a number of mine sweepers while engaged in this dangerous work, for even the assistance given by the balloons was by no means able to always prevent such accidents.

It was not unusual for a mine sweeper to be towed to its base with its whole stern blown away after striking a mine. More often those who were unfortunate enough to strike a mine sank before they could return to their bases.

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Riveting an Airship

(*Continued from page* 44)

All of the rivets used in the framework of the Akron are about one-eighth of an inch in diameter. They are heat-treated in electric furnaces, where they are held at a specified temperature for nearly an hour. They are taken from the furnaces and immediately quenched. They must be squeezed within a certain time after the quenching process. This period is known as the aging period, and if the rivets are not used within this time they must be heated as before.

The number of rivets in the Akron will correspond to the number of cubic feet gas capacity of the ship; in other words, there is one rivet for each cubic foot of helium.

Seven main frames and eighteen intermediate frames of the Akron are now in position, representing 525 feet of the ship's total of 785-foot length. The first ship will be completed by the spring of 1931.

Some Points on Parachute Jumping

(*Continued from page* 43)

rather get out of an airplane in mid-air with a parachute lashed to me than leap into the ocean from a ship with a life-preserver around my waist. All things considered, the parachute is probably the safer of the two devices.

"People have been taught for centuries to look on the life-preserver with assurance, but still associate parachutes with the occasional county fair performer who is killed because something goes wrong.

"That fact accounts for one of the amusing things having to do with jumping, as we jumpers see it—the disappointed look on the faces of observers when we come down safely! What they expect to see is the jumper's finish. It isn't in the working of the parachute that they are interested, but in the possibility of its not working!"

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See Announcement on Page 3

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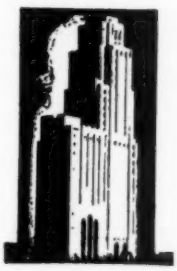

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Tobacco Redeemer contains no habit-forming drugs of any kind. It is in no sense a substitute for tobacco. After finishing the treatment, there should be no desire to use tobacco again or to continue the use of the remedy. In case the treatment is not perfectly satisfactory, we will gladly refund any money paid. It makes not a particle of difference how long tobacco has been used, or in what form—whether it is cigars, cigarettes, pipe, plug, fine cut or snuff. In most cases Tobacco Redeemer removes all craving for tobacco in any form in a very few days. And remember, it is offered with a positive money-back guarantee. Write today for our free booklet showing the injurious effect of tobacco upon the human system and convincing evidence that TOBACCO REDEEMER has relieved the craving for tobacco in thousands of cases.

NEWELL PHARMACAL COMPANY
Dept. 078 Clayton Station St. Louis, Mo.

XUM

Ocean Flights Are the Bunk!

(*Continued from page* 24)

guess. Send planes, ships. Altitude, 4,000 feet.

7:30 *a.m.*—Altitude, 100 feet. Looking for ship to land near. Forgot to reel in aerial. It has carried away. Emergency fish aerial weight too large for fair lead. Can't even send now. **Released emergency** pigeons. No use drowning them.

The engine quit cold. I tried to dive her into starting again. Pumped like hell. Hammered gas tanks. Got first good view of mid-Pacific. Looked wetter than hell. Just ready to park the crate on top of a nice soft wave. Engine picked up. Roared away as if nothing had happened. That just made things tougher. I knew we didn't have much gas left and roaming through that damned fog had made me worry about whether we were headed right. If we were lucky enough to last it out, we might miss the islands and head on out across the Pacific toward China. It is a cinch we could never get that far.

8:00 *a.m.*—Just got longitude sights. Put us west of our dead reckoning position. Hauled south to make sure we don't land in Kauai channel. Observation conditions very poor.

I kept her nose on the water looking around for ships. No use trying to get altitude. Couldn't get enough to do any good.

9:00 *a.m.*—Altitude, 50 to 100 feet. Looking for ships. Gas end any time now.

Decided to pull her back into the clouds to see what we could see ahead.

10:00 *a.m.*—Altitude, 7,200 feet. Looks like mountain peak ahead, but clouds are deceiving—— Land all right. If gas holds out we should make it—either mountain on Hawaii or Maui. Changed course to westward. Have just sighted another mountain. Must be Maui. Cross bearing—both peaks. Set course Wheeler Field.

Oh, man! What a grand and glorious feeling!

* * * *

At 1:30 p.m. our gas gave out as we were skirting the southeast coast of Molokai, heading for Oahu. Our course from Maui would have taken us over Molokai, but the clouds, mist and rain squalls over the island made it advisable to keep in the open along shore as the main part of the island was invisible. At about 2:27 p.m. the motor sputtered and stopped.

We swung to land, nosed down and motor started again for about thirty seconds and then stopped completely. We headed back and swung sharp for shore. At this time our altitude was about 75 feet and we were about 90 feet off shore. We headed for a soft looking clump of trees on the beach and crashed in them. About 30 miles short of Honolulu.

I tried one of the old army landings. Picked out two trees and flew between them to shear off the wings. All was well until a third tree loomed up between the two. The crate was pretty well washed out and we got shook up some.

THE first person we saw after crawling out was a wagon driver from the leper colony. He was smoking a cigarette. I was about done up for a smoke. I ran over and snatched it out of his mouth.

Told him we were from California. He didn't seem to understand. I asked him to drive us to the nearest house. He answered, "Five dollars." Some guesser. That's about all we had with us. Didn't expect to spend any along the way.

He drove us to Judge McCorriston's home. We sent cablegrams from there telling of the landing.

Learned later that the newspapers had out extras about us going down in the Pacific. The editors didn't know how near right they were.

An army ship flew us over to Wheeler Field. One of the first to greet us was Dole, the pineapple king.

He wanted to know why we didn't wait for his race. Said it was a shame to jump the gun on the rest of the boys. And me figuring on the hop before he and his pineapples ever thought of getting airminded!

Then came another bawling out. The secretary of the navy had given out a long statement raising hell with us for sending out a call for help. Seems several boats had gone off their course to rush to the spot. We should have used discretion in calling for aid, the secretary said.

If anybody ever needed help, we sure needed it when the engine gave up 700 miles out from Honolulu. If the spare aerial hadn't jammed in the fairing, we would have sent out a recall when the engine picked up again. However, things didn't look any too hot even then, and we still needed help.

The secretary must have thought we were a couple of hog callers. I guess we should have sooey sooeyed the vessels into going back on their courses and forgetting about us. If I had seen a ship then I would have kissed the captain.

From then on till the next couple of weeks it was chicken dinners and speeches and receptions. When we got back to the states there was more of the same.

Then the public promptly forgot that Ernie Smith ever existed. And that's what makes me wonder why I didn't get a break.

I don't expect or don't want folks to bow and scrape or cheer when I walk down the street. All I want is to have them stop saying "Who?" when somebody brings up my name. If I haven't anything else coming, I think the hop to Hawaii warrants my promotion from the "just another Smith" class.

It sure was a lot of grief while it lasted, but I wouldn't have missed it for anything. By the way, this ocean flying is a good way to reduce. I lost seven pounds between the hop-off from Oakland and the landing on Molokai.

What am I doing now? Oh, nothing much. Just trying to get myself an airplane to hop across the whole blinking Pacific in one jump and then on around the world.

And all I hope for is a break.

The Fate of a Pioneer

(*Continued from page* 30)

transactions in the two countries were thus able to be completed in the same day at the saving of thousands of dollars in each city.

Five large planes were in daily operation and MacKensie-Kennedy never had an accident on his line. Then the Scotsman actually did the unbelievable thing of persuading Lloyd's to sell airplane insurance at the same premium as that of steamship or railways. So successful was this that he got Lloyd's to offer to take over all insurance of aircraft from the British Air Ministry. The latter's refusal, in the Scotsman's opinion, has been detrimental to British aviation ever since.

Once again "the breaks" were against him. British Parliament suddenly passed a subsidy act by which two rival airlines were given grants of $300,000. MacKensie-Kennedy's customers felt that they didn't want to go into competition with the Government and quit. And MacKensie-Kennedy quit too. "The subsidy act was unnecessary," he said, "and the British taxpayer has been paying for it ever since."

As for MacKensie-Kennedy's patents, under the Defense of the Realm Act which was passed as a war time measure, all data and inventions were pooled for the common weal and he could not collect on them.

"I'm through with aviation," said the daddy of the big planes sadly, and he packed up his drawings . . . his plan for a two thousand horse power combat plane which the British Government had proclaimed to be twenty-five years in advance of its time; his tail machine gun invention, for eliminating a plane's blind spot . . . and his many other inventions.

And the daddy of the big plane, determined Scotsman that he is, meant what he said. But Wall street, and its millions has a way of finding things out . . . so MacKensie-Kennedy discovered when it sought him out in his little room on West street.

Some day, in the not so distant future, you will see new commercial planes, built to a radically different design . . . and bearing the hall mark of J. H. Chesborough MacKensie-Kennedy.

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READERS

POPULAR AVIATION will be very glad to forward letters from readers direct to any aircraft manufacturer. Perhaps you were especially interested in a particular lightplane, model or glider described in this issue. Merely write a letter addressed to the manufacturer whose product interested you, asking for further particulars, send it to POPULAR AVIATION, and it will be promptly forwarded.

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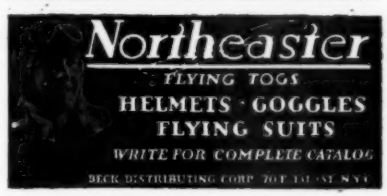

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DOES 50 H.P. interest you? Complete instructions for converting the Ford A motor to an aircraft motor. $2.00. Box 44, Station A, Indianapolis, Ind.

AT ONCE—South America or United States. Permanent positions; labor, clerical, mechanical, salesmanship; experience unnecessary. Salaries, $25-$100 weekly; transportation furnished. Drawer 1175 SB, Chicago.

APEX GLIDER MOTORS, 10 H.P., 28 lbs., 3⅞x2¼, Twin Cylinder. Complete castings, $75. Agents wanted. Discount to machinists. Dime for list. P. O. 443, Berkeley, Calif.

L. C. PILOT, Curtiss trained. Unattached. B. Blanchard, Evart, Mich.

XUM

$2 → LINDBERGH'S NEW LOCKHEED
The "Dog Star"

Scaled direct from drawings furnished by the manufacturers

Aviation's Fastest Commercial Plane

Ideal Christmas Gift for your model building friends

Again Champion steps out with a new construction kit that sets new standards of value for model builders. Without doubt the Lockheed Sirius is the most faithful reproduction of the full-sized plane it is possible to make and still have it fly. Every important detail has been reproduced, such as streamlined pants, gold and orange striping, N. A. C. A. cowling, even the Lockheed trademark and Lindy's famous license number, "NR-211," an exclusive feature of Champion kits. Nowhere else can you secure such a complete kit of aviation's fastest commercial plane for $2. This Lockheed Sirius is the most popular model for Christmas and you will be the envy of every model builder who sees it. Get one NOW!

Two-foot model with formed balsa prop, balsa pants shaped, celluloid wheels, windshields, stamped ribs and bulkheads, orange and gold striping, all insignia, black and orange-red tissue covering, Champion's new rubber motor developing 10 per cent more power, colorless cement, wire parts formed, ABC directions, all complete in stout mailing tube, specially wrapped in Christmas paper for holiday giving. Others ask $3 to $5 for kits not near as complete as this. **$2**

This Holiday special comes to you prepaid, Canada and west of Denver, $2.20. U. S. postpaid.....

Deluxe Kit - $3

Same as above but with celluloid N.A.C.A. cowling and celluloid pants in place of balsa cowling and pants. Packed in display box, wrapped for gift-giving. Postpaid Canada and west of Denver, $3.20. U. S. Postpaid $3.

Why Model Builders Prefer Champion Construction Sets

1. REALISTIC DESIGNS

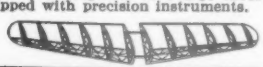
"Good scale copy of the real plane," writes Fred Lovelace, Michigan. Bracing like real airplanes.

2. CLEAR DIRECTIONS

Hundreds of dollars invested in detailed perspective drawings. Every part, detail and operation shown in correct 1-2-3 order. Also complete word descriptions.

3. EXACT ENGINEERING

Designs and materials tested scientifically by M. I. T. engineer in charge laboratory equipped with precision instruments.



4. FINEST MATERIALS

SELECTED IMPORTED BALSA
CHAMPION RUBBER DEVELOPES 10% MORE POWER
QUICK-DRYING COLORLESS CEMENT
HAND CARVED TRUE PITCHED PROPELLERS

5. LOW PRICES

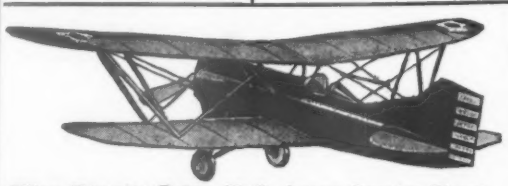
"I bought 7 or 8 models from various companies but I have yet to find such a bargain as your kit." "My $2 model flies better than one I got elsewhere for $9.50." "Materials best I have yet obtained."—From model builder letters.

6. INSTRUCTIVE—NOT TOYS

Teach how an airplane flies. Fun that is profitable. Learn aviation quickly at low cost.

7. THEY FLY!

Note what model builders are saying on the next page. Volunteer statements that Champion models fly unusually well.



Wins District Prize--U. S. Army Curtiss Hawk Flies 46 Seconds

Detroit, Mich., builder wins District Prize with this flying Curtiss Hawk kit. Another reports 48 seconds duration. Realistic reproduction of Uncle Sam's fast stepping pursuit ship. Celluloid wheels, imitation exhausts, synchronized machine guns, staggered adjustable wings. Army insignia in colors, detailed full size blueprints, complete. Hand-carved, 10-in. prop., included in all kits. To be covered with yellow and olive drab tissue. Canada postpaid $3.30; U. S. postpaid..... **$3.00**

DELUXE AEROCRAFT SET

To be covered with imported silk, genuine Hawk olive drab and yellow dopes thinned down for model use. Canada and west of Denver postpaid $5.50. U. S. postpaid..... **$5.00**

$5 MONTHLY PRIZE for BEST LETTER

Beginning with December, 1930, and continuing indefinitely, we will award a $5 merchandise certificate monthly for the best letter received during each month that contains 1. Some definite model building kink, such as a better way to hold the work, a rubber lubricant formula, model design formula, use of some new, easily obtainable material in a new way, etc. This kink or idea should be something we can pass on to the model building fraternity to help them in their work. 2. What model building is doing for you or suggestions as to how we can improve our kits. For every letter containing a useable kink, we will award $1.00 merchandise certificate. So get busy, model builders, and send in your ideas and suggestions. You do not need to buy any Champion material or kits. Just address your letter to Model Kink Editor, in care of Champion Model Aircraft Supply.

HYDROPLANE

Scientific type model equipped with light pontoons. Big sport flying it from creek, river, lake or tank. Very light, contest designs give good duration. Complete construction kit. Canada $1.20. U. S. postpaid..... **$1**

WIN SILVER TROPHY AND $100 IN GOLD

Order a kit today. Complete your model and return the official entry blank enclosed with each kit. Upon qualifying your model, you are licensed PILOT and awarded Silver Wings to Wear. From pilot you advance to Flight Commander, Squadron Commander, and the winner of the Grand Gold Prize of $100.00 and the 18 inch Silver Aviation Trophy will be known as Champion's Ace for 1931. Talk about fun! Talk about thrills! There's nothing in model aviation equal to this big $1,000 Contest, 165 Awards. Honor Certificates to all qualifying entries. Complete rules and regulations with each kit. The sooner you start the better your opportunity to win! Mail your order NOW! Your kit will be rushed to you by return mail.

All-Silver Lustre Finish Spirit of St. Louis

Here's a 1½ foot flying cabin model of Lindbergh's historical New York-Paris Ryan monoplane. Finished in brilliant silver lustre. Nothing like it on market. Dozens of builders have qualified for merit certificates. Exceptional flight of 90 seconds reported by New York builder. Tough mitschfibre wing 18-inch span. Wt. 1½ oz. Simple ABC assembling outfit with numbered parts. No tools needed. 6-inch fibre prop, readicut wood struts, Clark "Y" wing ribs, 1½-in. disc wood wheels, detail drawing pictures, full directions, all parts in mailing tube; postpaid U. S. $1; Canada postpaid $1.20. **$1**

Hey Fellows! See what I built! Dad gave me a Champion Kit for Xmas.

$2

FLY Admiral BYRD's "STARS and STRIPES" FAMOUS FOLDING WING FAIRCHILD 71

South Pole Model Ski-Equipped to Rise Off Snow

Picture the envy of the gang when you bring out this eye-arresting "Stars and Stripes" and send it flying over snow banks and drifts. Ski equipped to rise off snow, just like Admiral Byrd did in his Fairchild at the South Pole. When flying conditions change, put on pontoons or wheels. Finished in black and orange, celluphane windows, workable doors, celluloid Wright Whirlwind motor, and the wings fold back for easy storage. Easy to build. Easy to fly. Every operation visualized for you, all dimensions given, so that building a Champion model is loads of fun.

"Consistently flies 300-400 feet," says Canadian builder. "Flies like a million dollars," writes California maker. From all over the United States and Canada come similar voluntary comments from enthusiastic builders that the Fairchild 71 not only looks better, flies better—but the construction set is the BEST MODEL AIRPLANE VALUE on the market. Not just one model, but a seaplane, landplane, snowplane, 3 MODELS IN ONE. The only Byrd "Stars and Stripes" offered to model makers, so get your order in early—before the Christmas rush begins.

Re-designed to make it simpler and easier to build than ever. Prop carving will not bother you, for there is a formed balsa prop as well as a block for contest flights. Span 24 in. Chord 3⅝ in. Length 17½. Wt. ¾ oz. Selected balsa framing readicut, cement, dope, wire fittings formed, stamped wing ribs, black and orange tissue, all Byrd insignia, celluloid wheels, material for balsa motor dummy; everything complete, wrapped in stout mailing tube, specially wrapped for holiday gift giving. A $5 value sold direct to you, Canada and west of Denver, $2.20. U. S. postpaid..... **$2**

3 Models in 1

WINGS FOLD BACK like those on REAL FAIRCHILD

Deluxe Kit - $3

Same kit but with celluloid Wright Whirlwind engine and spinner. Packed in large display box and wrapped for gift giving. Canada and west of Denver $3.20. U. S. postpaid $3.00.

FREE! ALL KITS WRAPPED FOR GIFT GIVING

All orders received during December are wrapped in brilliant red holly paper for gift giving. Deluxe display sets sealed with special airplane seals and neatly tied with a gift card. Give Champion model airplane construction sets this Christmas. When requested we write your name on gift card and ship direct to one you wish to remember, saving you the bother of re-mailing.

NONE SOLD IN STORES

Because these construction sets have just been completed, you will not find Champion kits in stores. Order direct from this announcement. Send in the coupon as soon as possible, so as to avoid congested mails at the holiday season. We have made ample preparations to handle all orders promptly the day they are received. But if you wait until the last minute there is just the possibility that unforseen delay might occur. Send in your order NOW and rest assured you will have your kits in plenty of time for Christmas.

MAIL THIS COUPON NOW!

DEALERS: Champion will offer in 1931 a totally different proposition for handling model airplane sets and supplies more profitably. Send in your name and address now and be on our list to receive the opening announcement.

Read What Model Builders are Saying About These New Champion Kits

"Flies as smoothly and steadily as the real plane. I think any beginner can build a satisfactory model from your kits," says Howard Doolittle, Connecticut.

Bruce Glassford, Canadian model builder, with his Fairchild 71. "I get constant flights of 300 to 400 ft. with ease. Model has perfect performance and long duration. My Fairchild is the best model airplane I have ever had during my career as a model builder."

Charles Bott, another Canadian builder, with his Champion model. "It will take off water; besides, land on water. Flies at about 15 ft. high and makes an excellent landing."

Wm. H. Schmitt, Chicago, Ill., age 15, flies his Champion model 17 minutes 33 seconds, winning first prize in Class B models second contest period. Flight witnessed and sworn to before notary.

FLIES 63 SECONDS

"Everything arrived safe, Boy! They sure are good airplanes. Mother said it wasn't worth anything if its only two dollars. But now she's said its better than the one I bought for $4.98. It flew for 50 sec. r. o. g. Hand launched 1 min. 3 sec. before it hit wire and pulled the wing off."

Yours, V. Szeligo, age 15.

TEAR OUT—MAIL RIGHT AWAY

BE THE FIRST TO FLY THESE NEW MODELS

New postal regulations make it necessary to require one-fourth down on all C.O.D. orders. Include 5 cents extra to insure delivery of your order.

CHAMPION MODEL AIRCRAFT SUPPLY, 1525 Atlas Building, Columbus Ohio

Gentlemen: I enclose $..... for which send me, right away, in special Christmas gift wrapping, model airplane construction kits I have checked below:

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- ☐ Spirit of St. Louis $1.00
- ☐ U. S. Army Hawk $3.00
- ☐ U. S. Army Hawk Deluxe $5.00
- ☐ Lindbergh Lockheed $2.00
- ☐ Lindbergh Lockheed Deluxe $3.00
- ☐ Hydroplane $1.00
- Extra for postage and insurance .....

Name .....

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City and State .....

Please Print Plainly

An Airy Chat with the Editor

(*Continued from page* 10)

knew how to take-off, and knew how to climb, but he forgot one thing. After the plane has cleared the ground, it should be flown level for a while in order that increased speed may be gained. Once speed has been attained, the climb for altitude may be resumed.

Further instruction on this important matter will be found in Mr. Rathbun's "Lessons in Flying" for this month.

LADY HEATH, our former women's editor, is back in England and writes us about her activities over there. She is president of the Woman's International Aeronautical Association and is organizing branches throughout Europe.

"Please accept my heartiest congratulations on getting Mrs. Thaden for the Women's Activities!" writes Lady Heath. "I must heartily recommend her. I just hated giving up my page but it was a great joy to me to see that she got it. No one deserves it more."

THE Department of Commerce have issued a bulletin on "Aviation Training." It can be obtained free of charge from the Aeronautics Branch, Dept. of Commerce, Washington, D. C. Ask for Aeronautics Bulletin No. 19.

This interesting pamphlet describes the various methods of acquiring training and also discusses some of the opportunities open to those properly trained.

CLYDE SCHWARTING of Guelph, N. D., wishes to buy a lightplane or a good primary glider. $250 cash is his price. Any offers? . . . Remember Donald Boggs, the reader who is laid up at the Macon County Tuberculosis Sanitarium? Several issues ago this column reproduced his letter and took the liberty of inviting other readers to write to him. Donald has since received quite a few letters and has several regular correspondents on his list.

G. W. RHODES of Auburn, Nebr., has a good suggestion to offer aircraft manufacturers:

"I want to compliment you on the last three issues of POPULAR AVIATION," writes Mr. Rhodes. "They have been excellent.

"Especially do I think you are doing well in giving so much attention to the glider and light planes. There is no doubt that there is a future good market for the light two-place plane, selling at a price much below the present priced plane.

"For myself, like many others, I could buy a $1,500 or $2,500 three-place, but, like many others, what's the use? I cannot use the present type plane to any advantage, other than pure pleasure.

"For instance, it falls to my lot to give a certain amount of supervision to some land in the western part of this state, automobile distance, 370 miles; airline distance about 320 miles. Best time by car, about 12 hrs., and a good method of getting around while there. Plane time, about 4 hrs., but no landing field and no place to land other than a field or pasture, and plane impractical for getting about on the 1-mile and 5-mile hops necessary while there.

"So plane manufacturers must make planes with lower landing speeds and folding wings, for storage in one's own garage. When they do, there will be a market; and it can be done."

Y KAWASAKI of Kobe, Japan, not only enjoys his copy of POPULAR AVIATION, but takes the time off to tell the editor all about it. In particular, reader Kawasaki was interested in the detailed description of the Curtiss XBT-4, a military training plane.

The "wobble pump" referred to in the XBT-4 description, puzzled Mr. Kawasaki, as it did several other readers. To satisfy this interest, a photograph and explanation of the "wobble pump" appears elsewhere in this issue.

THERE'S nothing like getting a good start in life.

Here we see a picture of Bruce Glezen of Oblong, Ill. Bruce is only three years old, but when his time isn't taken up with more urgent matters, he sits on his little chair and absorbs POPULAR AVIATION from cover to cover.

At any rate, we have his proud father's word for it.

J. S. OTT, our model designer and contributor, has a staunch follower in Alfred C. Zsibry of Chicago: "Dear Editor:

"In reading your magazine, POPULAR AVIATION, the part that strikes me as the most interesting is the model department.

"Mr. Joseph Ott stands ace-high with me as far as designing models is concerned. I think that the models presented each month are the most interesting and best designed of any models built.

"In last month's issue I read that you are to offer an extra feature; that of having Mr. W. Rigby offer some novel models. Well, that's O. K. with me as long as you offer that as an extra feature and do not cut out Mr. Ott's Model Department. Please don't stop this original and interesting source of perfect model plans."

Don't worry, Al; Mr. Ott will be with us again soon.

GILBERT WESTPHAL of Hollywood is the writer of the following interesting letter:

"Dear Sir:

"I am writing to you relative to a note published in the October issue of POPULAR AVIATION, showing a photograph of a miniature rocket airplane. The article described the performance of a ship which was constructed and flown in exhibition by myself.

"For more than a year I have been building and flying rocket planes, and have compiled considerable data which might be of interest to your readers.

"I have been building model airplanes for three years, and have broken several national and sectional records in flying competitions in Los Angeles, using rubber propelled craft, and also have a supply of information on them.

"Your magazine is a very interesting fund of information, and seems to be up to the moment on all phases of aeronautics."

Our readers are very much interested in your experiments, Gilbert. Let us know how your rocket plane is coming along. Also give us some particulars on the model you have built which gives you a 60 m.p.h. performance.

M. C. HUNT of LaGrange, Ill., wishes to see some pictures of planes used in the World War. No sooner asked than published, Mr. Hunt. We are having an article prepared on World War types—with photographs—and may even include some scale plans for model-builders.

TOM PRIEST is one of our Canadian readers. He wrote us to tell that he didn't care so much for our monthly true war story. He would prefer an article on "how to adapt motorcycle engines, and how to care for them."

Tom built a glider, but the instructions he followed made a mistake in the name of the wood to be used. He found this out after he had nearly completed the glider. This unfortunate experience forced him to quit.

Too bad, Tom, but why didn't you wait for POPULAR AVIATION plans. Quite a few readers who built Rhon Rangers from our plans have highly praised the correctness and clarity of these instructions. You own countryman, W. A. Butcher, won first prize with his Rhon Ranger, built from P. A. plans.

B. G. D.

The editor will be pleased to receive editorial contributions from readers. Short articles and photographs are particularly wanted on new designs, unusual ideas, radical theories, flying contraptions, safety devices, home-built planes and gliders.

The Heath Parasol

(*Continued from page 54*)

month's article. Do not tighten any wires at this time.

Auxiliary Compression Strut

CLOSE to where the flying strut fittings will be, at the bottom edges of the spars, an auxiliary compression strut is placed. This is shown on your wing print as being 3¾" from the seventh rib from the butt end. It is made from item V-12 which was listed last month.

It will be necessary to turn the wing over to attach this strut, for the triangular gusset plates (V-15) of ⅛" plywood are nailed and glued to the spars and the strut on their bottom surfaces.

Be sure to attach these gusset plates so that they do not interfere with the flying strut fittings which will later be bolted to the spars.

Aileron Pulley Anchorage

THE aileron pulley anchorage is next and is shown on your print in detail No. 5. Its location, as shown on the wing print, is on the inside of the front spar just beyond the ninth rib from the butt end. There is only one in each wing panel.

Take item V-61 and with a chisel cut two pieces 7½" long. Bend both ends of each strip at right angles to the center portion, leaving the center part 4⅝" long and each upturned end 1 7/16" long, inside measurement.

At a point ¾" from the inside corner on each short end drill a 13/64" hole. At a point ⅜" from the inside corner on each short end drill a 5/32" hole. Countersink these last two holes from the outside.

Take item V-14 and saw two pieces 4⅝" long, channel one side of each piece to accommodate item V-52. Cut also two pieces of wood 2"x1"x⅝". These are filler blocks to be glued and nailed to the undersides of the spars. One grooved piece is now glued and nailed in position as marked in the wing print, its top flush with the top of the spar and its grooved surface against the spar.

The metal strap is placed on from the front edge of the spar, its ends extending over the spar to the grooved block. Item V-63 is used to hold the strap in position. The pulley shackles (V-62) are placed as shown in detail No. 5 and held by the long 3/16" bolt (V-52). The pulley housings are attached to the shackles by clevis pins (V-54). The pulleys (V-51) are secured in their housings with clevis pins (V-53).

Two aileron pulley assemblies are used in each wing. The fifth pulley which is supplied will be attached to a take up screw and described later on.

This ends the work for this month, and finds you with the wing fairly well along. Next month we will complete the wings, except for the gas tank and covering.

RHON RANGER LEADERSHIP

is based on a consistent record of high performance. Glider enthusiasts the world over eagerly express their satisfaction with the economy, the splendid flying qualities, and the sturdiness of the Rhon Ranger. YOU, TOO, can experience the unmatchable thrill of flying a Rhon Ranger, on terms that will not tax your purse. This superb glider is offered in a series of carefully prepared, easily assembled Construction Kits, complete in every detail, for only $89.50. Or it may be purchased in six convenient progressive groups costing only $15.00 each. You don't have to "wait your turn" with Mead Gliders . . . . . your order is shipped the same day.

Hundreds of others have successfully built and flown Rhon Rangers, and have profited by the knowledge gained during the fascinating construction process. After all, there's no thrill like flying a Rhon Ranger you've built yourself.

Our latest catalog gives you full particulars and many other interesting features. 10 cents brings it to you by return mail.

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XUM

Lost Instrument Found

(*Continued from page 26*)

radioed for assistance and the aircraft carrier U. S. S. Wright was sent out. As the rescue boat approached preparatory to throwing a line from the deck derrick, a running sea tossed the plane against the Wright and wrecked the wings so badly that little was salvaged.

Factory records of the Pioneer Instrument Company verify that the instrument was placed in the flying boat and data in the possession of Lieutenant Schildhauer substantiates the information that the octant probably was lost at the point where the plane turned over.

Accidents Will Happen!

(*Continued from page 42*)

of metal, probably left there when the baffle plates in the bottom of the tank were being placed, crept out of its hiding place at the wrong time, slipped down the fuel line and was caught in a joint.

Spannagel had barely gotten off the ground when his motor sputtered. He wasted little time after the engine had caught, then missed again, before closing his switch and settling back on a runway which fortunately was long enough.

Foul magneto points have taken their toll of pilots and planes. There is a steady corrosion of metal going on all the time the magneto is generating its life-giving ignition energy for the motor. Sometimes there is little warning that the points have gone bad until the motor suddenly stops.

Ham Brown, who was flying a commercial plane powered by an OX-5 motor at Hopewell, Va., in 1928, had one of these experiences with tricky magneto points which he will not soon forget.

Brown was flying out of a field not much larger than a good-sized back yard. On the west was the county road, paralleled by telegraph and telephone wires. On the south was a stretch of forest land—called "woods" in the South—which extended back about 300 yards. On the east was a fringe of trees, with gaps of 75 to 100 feet available for a careful pilot landing a slow ship. On the north were more trees, but with a larger gap for approaches or takeoffs.

The wind this day was from the south. Brown could not take off cross wind without trying to climb over either the county road or the gaps in the trees on the east.

It is extremely unhealthy to aim for a 75 or 100 foot gap when you have a cross wind, for an almost imperceptible upward tilt to the windward wing may send you sideways a hundred feet before your instinct corrects it.

A downward takeoff, to the north, also was out of the question for, in addition to the other worries, the ground sloped upwardly in that direction.

Brown got off, headed south. He was clearing the first of the trees by nearly 50 feet when the magneto points—it was discovered later—decided to call it a day and quit.

There was no chance of gliding 300 yards with an altitude of less than 50 feet, so Brown tried to turn back to the field. But he had gotten too far over the trees by this time and was unable to stretch his glide sufficiently after nearly completing the turn.

Brown and his passengers are still living, but the plane was such a wreck that when it was picked up and sent back to the factory for overhaul, the company charged four-fifths of its original cost to do the work.

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A Mission to Hunland

(*Continued from page* 14)

came tumbling down toward me. Nearer they came—still nearer, the reflected sunlight flashing kaleidoscopic colors from their varnished wings, until I could see their marking clearly, one British and one German. A Nieuport and a Fokker, engaged in single combat. With a startling suddenness the two fighting planes came together in mid-air with a sickening crash which I clearly heard above my motor's roar. I saw them dropping towards me at an alarming speed. They were interlocked with each other, and in their death plunge they missed me by a few scant feet.

About 100 feet from the ground they fell apart, but both of them crashed in the same field at the same time, and both caught fire upon impact with the ground.

I learned later that the pilot of the Nieuport had one leg shot off in an air battle about a year ago—and insisted on coming back to fight again. He was a South African.

Well, I resumed my twice interrupted climbing and soon came up to the level of the main scrap and instantly two enemy ships dived at me from different angles—coming at me hell-bent!

I never really knew what happened. All that I remember is seeing pieces of strut and torn fabric flying off of my plane in all directions, followed by a sudden short stab in the leg, and then again in the shoulder.

The pain in my leg was intense. I must have taken my foot off the rudder bar, for I found myself spinning earthward dizzily—wires screaming and blood from my hurt leg freely flowing. I remember seeing a plane go past me in flames, and found out later that it was the fellow who shot me.

Somehow or other I got my ship under control and headed for home. Things seemed to be getting all blurred —my shoulder got numb and I suffered untold agony from the wound in my leg. I do not remember passing over No-Man's Land, so must have fainted and the trusty old crate just kept on flying.

What brought me to was a sudden rush of cool air in my face, and I gathered my scattered senses just in time to realize that I was falling—and doing it quickly. I made an effort to work the controls, but my weakened condition did not permit it, and I saw the earth rushing towards me. I felt that it was all over, and shut my eyes.

My plane hurled itself into the branches of a huge elm tree—the only thing that saved me for it broke my fall. The plane hung in the top branches for about half a minute, then toppled slowly sideways and brought its distinguished career to a glorious end by breaking into a hundred pieces.

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